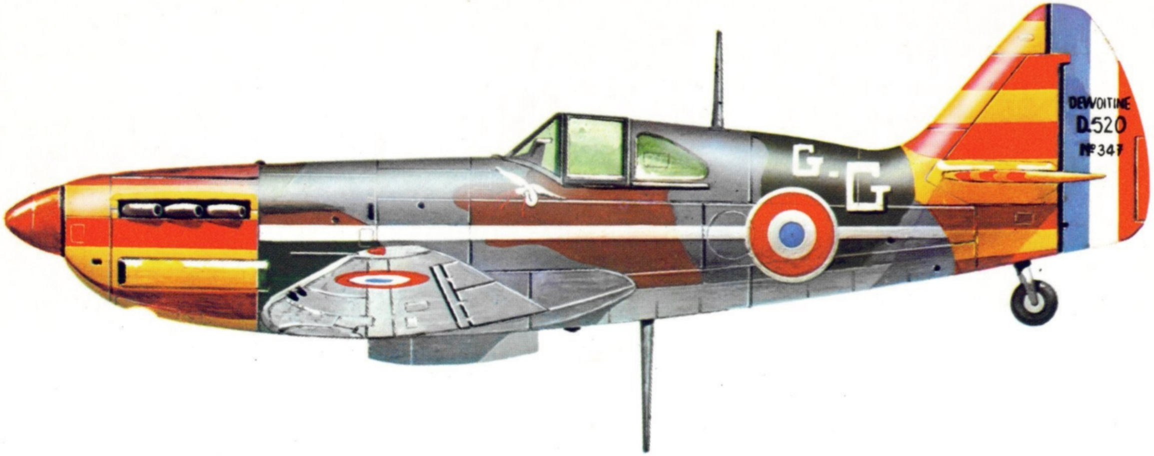
Men&Machines

French Fighters

Of World War Two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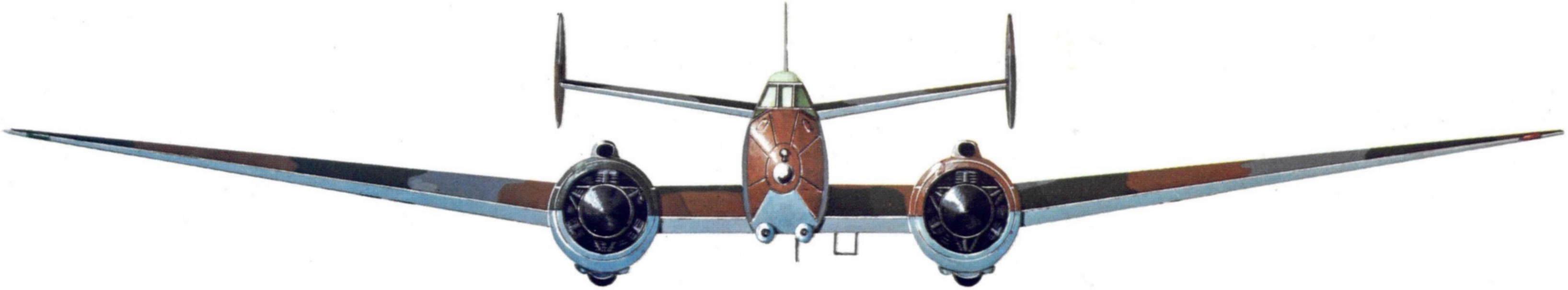

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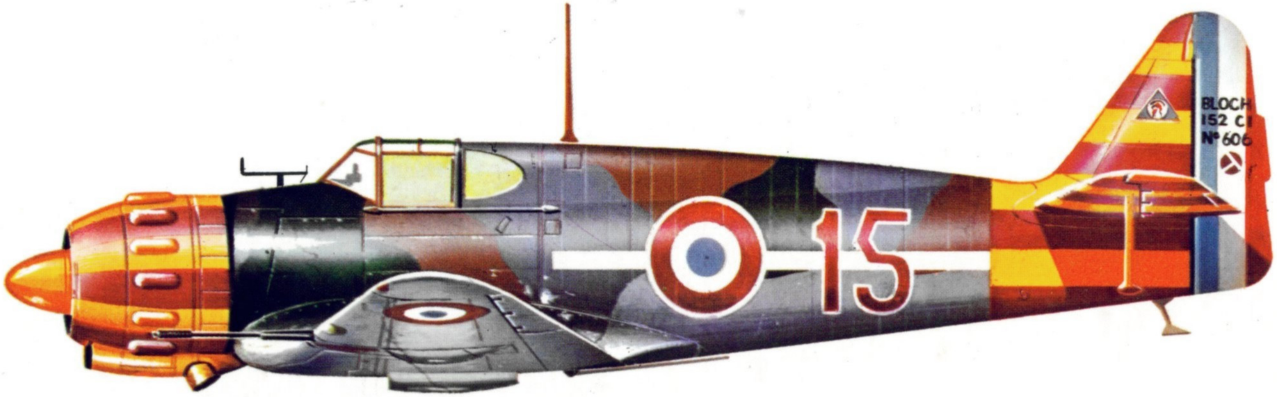
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French Fighters

Of World War Two

Volume One

by John F. Brindley

Illustrations by Thomas Brittain Terence Hadler Michael Trim
General Editor Charles W. Cain

Hylton Lacy Publishers Limited, Windsor, England

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FOREWORD

The title of this book, "French Fighters of World War Two", is not entirely accurate—it is more the story of the fighters of 1939–40. Aircraft development in France was more or less completely halted under the terms of the Armistice of June 1940 and it was 1946 before a new French fighter design took to the air. Essentially, this book describes the four main types in production in 1940, although I have taken the liberty of including one non-French design, the Curtiss Hawk 75A, to allow the story of French Air Force (and Navy) fighters of 1939–40 to be dealt with in one work. To lay the foundation for the chapters on the individual aircraft types, there is an introductory chapter which discusses briefly certain subjects complementary to them.

A major obstacle faces anyone wishing to make an in-depth study of French aviation during World War 2: the loss of much valuable source material either destroyed or plundered by the Germans in 1940, destroyed by the French themselves at various times or, simply mislaid. In addition, the Riom "hearings" of 1942 and post-war inquiries in France as to what happened in 1939–40 must be suspect because of their political nature. In 1942, Vichy officials were at pains to preserve their reputations at the expense of the absent Gaullists, while after the war "collaborators"—and anyone unpopular who happened to be dead—were considered fair game for the accusatory finger.

Did the French bring defeat upon themselves in 1940 by their own political and military incompetence between the world wars, or were the German armies more or less unbeatable in 1940? The first hypothesis is generally accepted to be correct but, whichever the case, the British owe their survival in 1940 to the strip of water which separates their island from the rest of Europe more than any other factor.

A recent awakening of interest in World War 2 among the French has greatly facilitated my task and their interest in this project has been most encouraging. Over the past few years, much new information has become available about French aircraft of this period and I have attempted to lay some popular errors of fact to rest. Where there is doubt in my mind on a point of fact, I have either qualified the statement or omitted it altogether.

The question of the camouflage and markings of individual aircraft remains controversial despite considerable research; it is not helped by the absence of firm directives on the matter by the French Air Ministry. The maximum possible has been done to ensure the accuracy of the colour reproductions within the limitations of the printing processes, and I hope that they will pass muster.

Among those who provided information and photographs used in the compilation of this book are: Ing. Eduard Baur; Gaston Botquin (who also helped with MS 406 colour information); Paul Camélio, of the Camouflage Air Club; Jean Cuny; Christian-Jacques Ehrengardt, of IPMS France; the Etablissement Cinématographique et Photographique des Armées; Interavia SA; Jean Liron; the Musée de l'Air; and Dr Pierre Rivière. Michael Brown helped check the proofs. One very valuable informant wishes to remain anonymous. My most sincere thanks go to them all and I should add that any errors which may have crept in are my sole responsibility.

There are two lasts but not leasts: my thanks to Hylton Lacy Publishers for allowing my work to see the light of day; and thanks to JCR for all the tea and sympathy she provided during the preparation of this book—without her interest it would have been written in half the time, but some of the fun would have been missing.

Geneva, Switzerland, 1970 JOHN F. BRINDLEY.

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Author's note

Each chapter devoted to a particular aircraft type is complete in itself. However, to avoid repetition, the introductory chapter has been included to give some explanation of general points. It is not continuous but has been divided into sub-headed topics for ease of reference.—JFB

Introduction

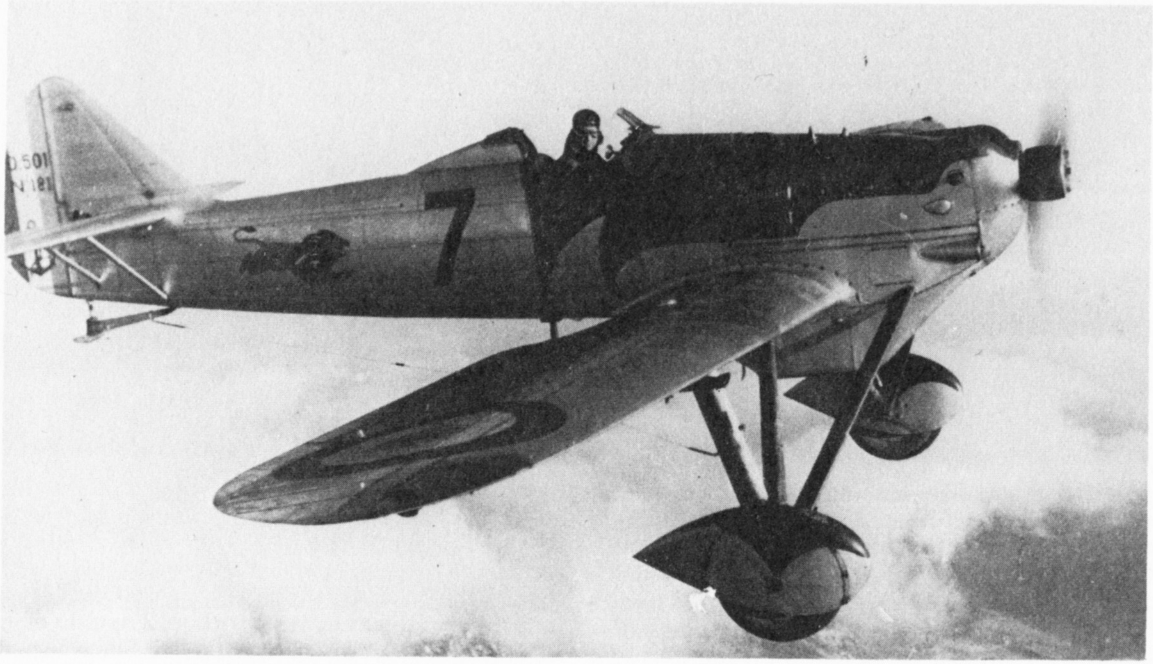
The purpose of this opening chapter is to give the reader a certain amount of background information on subjects related to the aircraft described in the book. It is divided into a number of headings and is not necessarily intended to be read in its entirety or in any particular order. The two chief subjects are the French aircraft industry and the flying services, but the author has taken the opportunity to discourse briefly on such subjects as camouflage schemes and the method of listing victories over enemy aircraft.

The Industry

The French came out of World War 1 with one of the world's most capable aircraft industries and one of the best-equipped air forces. Despite strenuous efforts to maintain a leading position throughout the 1920s, the industry had slipped into decay by the mid-1930s. The resurgence of militarism in Germany and its threat to France resulted in an Air Force re-equipment plan that the French industry was quite unable to fulfil—the 34,000 strong industry was only producing about 40 aircraft per month in 1935–6.

The advent of the Left-inclined Popular Front Government in mid-1936 was the signal for the nationalisation of France's aircraft industry. By the outbreak of World War 2, the French airframe output still lagged behind that of the United Kingdom; about 100,000 workers in France were producing 200 aircraft a month. The only problem was that the output of aero-engines, armament and equipment was erratic at best, resulting in bottlenecks in the delivery of completed aircraft to the Air Force.

The original nationalisation decree of August 1936 envisaged the State control of all companies producing military aircraft, aero-engines, armament and equipment. The State had the right to buy or otherwise acquire all organisations involved in such work and all their designs and construction rights. Factories taken over in this way were to be grouped geographically into "Sociétés Nationales de Constructions Aéronautiques". The nationalisation of the airframe sector was completed without undue difficulty, but attempts to extend the scope foundered for various reasons, chiefly political. The Gnôme-Rhône and Hispano-Suiza aero-engine companies remained independent, the ailing and militarily insignificant Lorraine organisation was the only aero-engine manufacturer to be nationalised. Plans to include armament and equipment producers failed to reach fruition.



A reminder of the days of peace before the Second World War; Dewoitine D 501 No. 181. The aircraft was basically natural metal with the forward fuselage and wheel spat decoration in black, as was the number 7

(Camouflage Air Club)

It was intended that only the nationalised airframe companies could undertake the production of military aircraft, although both State and independent organisations could develop prototypes. Some of the companies absorbed by the scheme continued to maintain independent design offices. In fact, as the Air Force's need for new equipment became more urgent, non-nationalised companies were given production contracts—a case relevant to this book is Morane-Saulnier, which received an order for 90 MS 406s in 1938.

The nationalised airframe companies and their former owners were as follows:

Société Nationale de Constructions Aéronautiques de l'Ouest (SNCAO), which grouped the Breguet Nantes-Bouguenais factory and the Loire-Nieuport facilities at Saint Nazaire and Issy-les-Moulineaux.

Société Nationale de Constructions Aéronautiques du Sud-Ouest (SNCASO), comprising the Marcel Bloch plants at Villacoublay, Courbevoie and Châteauroux, the SASO factory at Bordeaux-Mérignac, that of UCA at Bordeaux-Bègles, the Lioré-et-Olivier plant at Rochefort, and the Blériot factory at Suresnes.

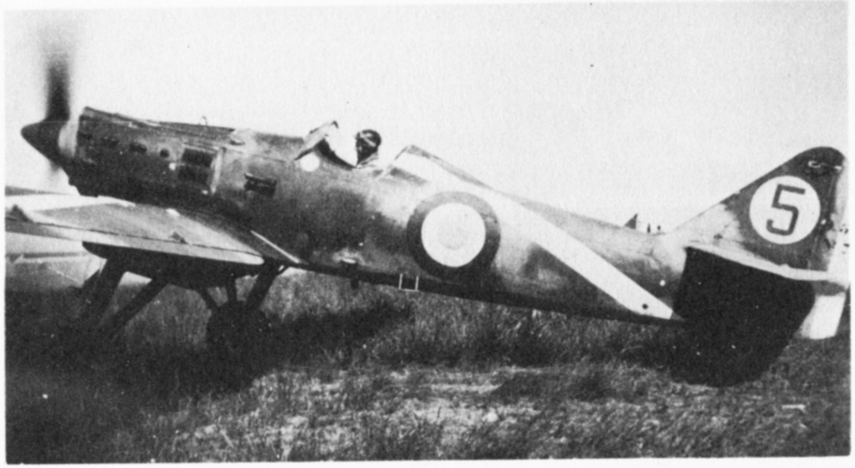
Société Nationale de Constructions Aéronautiques du Nord (SNCAN), grouping the Potez factory at Méaulte, that of CAMS at Sartrouville, the Amiot plant at Caudebec-en-Caux, the ANF-Mureaux facility at Les Mureaux, and that of Breguet at Le Havre.

Société Nationale de Constructions Aéronautiques du Sud-Est (SNCASE), which comprised the Lioré-et-Olivier plant at Argenteuil, that of Potez at Berre, the CAMS facility at Vitrolles, the Romano factory at Cannes, and that of SPCA at Marseilles.

Société Nationale de Constructions Aéronautiques du Centre (SNCAC), which united the Hanriot factory at Bourges and that of Farman at Boulogne-Billancourt.

Société Nationale de Constructions Aéronautiques du Midi (SNCAM), which was the former Dewoitine plant at Toulouse.

These named acquisitions were effected during the early months of 1937. In addition, there was the newly-formed Government Air Arsenal—



D 501 No. 73 in use as a trainer in 1940 (Dr Rivière)

The bulk of the French Air Force's fighters during 1936-38 were Dewoitine D 500/501/510 aircraft, but the 6th Escadre de Chasse operated the Loire-Nieuport LN 46 during this period. Sixty were ordered in 1935 and some of these were sent to the Spanish Republicans early in the Civil War (Interavia)

usually abbreviated to Arsenal.

An indication of the output of the French industry up to the time of the Armistice on June 25, 1940 can be gained from the following approximate production figures for fighters: Bloch MB 151/152/155 series—632 taken on charge by the Air Force; Dewoitine D 520—438 (403 taken on charge); Caudron C 714—56 taken on charge; Morane-Saulnier MS 406—1,098 (including MS 405s); Potez P 630/631—303; Arsenal VG 33—7 taken on charge. "Foreign Aid" was represented by about 300 Curtiss Hawk 75s from the United States of America and 14 Koolhoven FK 58s from the Netherlands which were taken on charge by the French Air Force.

The French Air Force

The French Air Force (official title—l'Armée de l'Air) became an independent service on April 1, 1933. Its history in the years immediately preceding World War 2 was chequered by France's chronic political instability and the Air Staff's lack of coherence on the subject of the Air Force's functions. In addition to its prime functions of protecting the homeland and supporting the Army in battle, it was supposed to have a strategic bombing capability, but this was not satisfactorily developed.

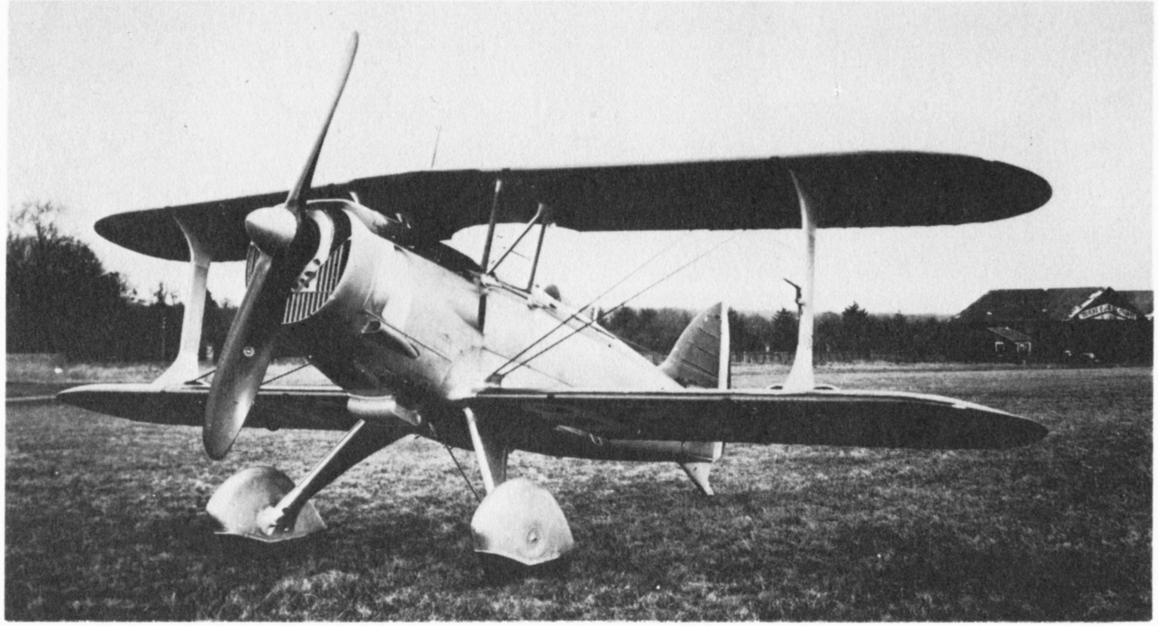
The first re-equipment scheme for the newly-independent service was drawn up in 1933 and, by 1938, four others had followed. It was this last, known as Plan V, which is most relevant to this book since it determined the equipment of the French Air Force in 1939–40. Plan V initially called for the procurement of some 2,500 modern combat aircraft, including nearly 1,000 single-seat and 200 multi-seat fighters, within 12 months of its promulgation in the Spring of 1938. Since output of the chief single-seat fighter of the time, the MS 406, was limited by a shortage of aero-engines, other types had to be brought into the procurement plan. Thus, it was the Industry's obvious inability to fulfil the quota which led the French Air Ministry to order the Curtiss Hawk 75A from the USA. The Curtiss aircraft performed well in 1939–40 but the MS 406's French contemporary, the Bloch MB 151/152, suffered development problems, these preventing deliveries getting fully under way until the end of 1939—and even then the aircraft was not considered "combat worthy" ("bon-de-guerre") by the Air Force. Not until March 1940 were the first fully operational MB 152s available.

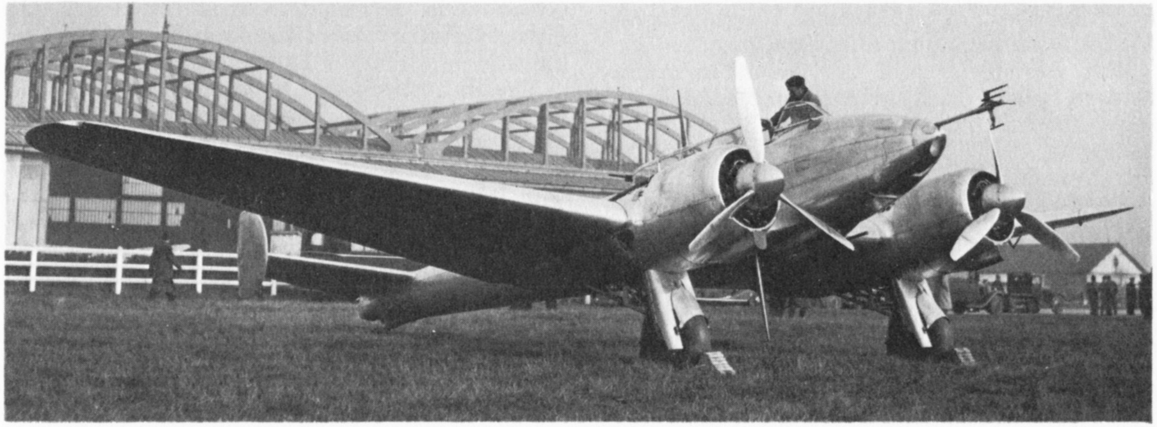
The French Air Force's morale immediately prior to World War 2 was good, despite the shortage of modern equipment compared with the German Air Force. The chief reason for the equipment shortage was the French Air Force's "poor relation" status vis-à-vis the Army, which received over half the total military budget. While the Air Minister was the titular head of the service, the most important person from an operational standpoint was General Gamelin, Chief of the Defence Staff. His views on air power were the traditional ones of an Army officer and the head of the Air Force, General Vuillemin (Chief of the Air Staff—and Gamelin's subordinate), did not have the drive to successfully further the interests of the French "junior service". As a result, a major defect in French defence planning was the lack of really close co-operation between the Army and the Air Force.

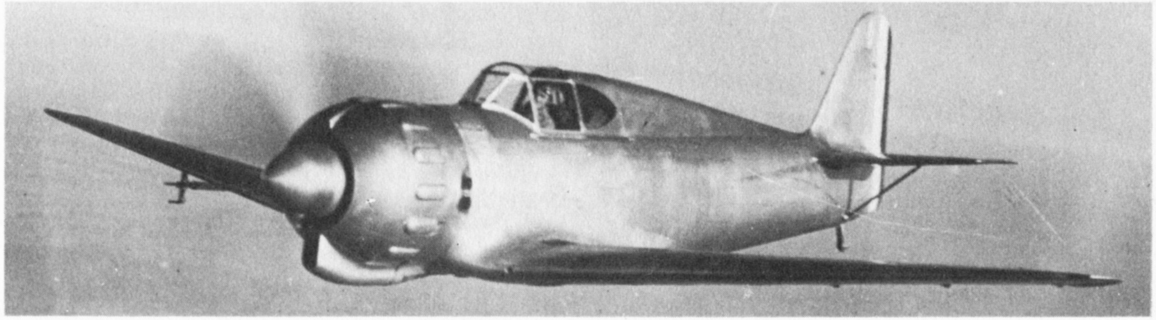
Air Force Units

In the peacetime years before World War 2, the main front-line fighter (Chasse) and bomber (Bombardement) formation was the Escadre comprising two Groupes. These were normally identified by standard form abbreviations such as GC I/2, GC II/2 and GB I/15. In turn, these would spell out as Groupe de Chasse and Groupe de Bombardement, with the roman numeral indicating the relevant Groupe followed by the arabic numeral for the specific Escadrille. After the outbreak of World War 2, the chief operational formation was the Groupe.

Each Groupe had a nominal strength of about 25–30 aircraft—some were occasionally "reinforced" above this strength—and was made up of two Escadrilles of 12 aircraft each; the nearest equivalent to the British RAF squadron. The Escadrilles within the Escadres were allocated numbers in a logically progressive fashion. For example Groupe de Chasse I/3 comprised the 1st







Top left: *In addition to the 300-plus Dewoitine and 60 Loire-Nieuport aircraft, 60 Blériot SPAD 510 fighters were ordered by the French Air Force. The 7th Escadre de Chasse operated the type in 1937-38 and it still equipped reserve units in the early days of the Second World War* (Musée de l'Air)

Middle left: *The Potez P 630 and 631 resulted from a 1934 specification, as did the Morane-Saulnier MS 406. These types constituted the main French fighter strength on the outbreak of the war. Here is the P 631-01 prototype* (via the author)

Bottom left: *The Bloch MB 151 and 152 were ordered in 1938 to boost French fighter strength to the level required by re-equipment Plan V, but development problems delayed deliveries and the operational deployment. The pattern aircraft for the series was the MB 151 No. 1 shown here* (Sud-Aviation)

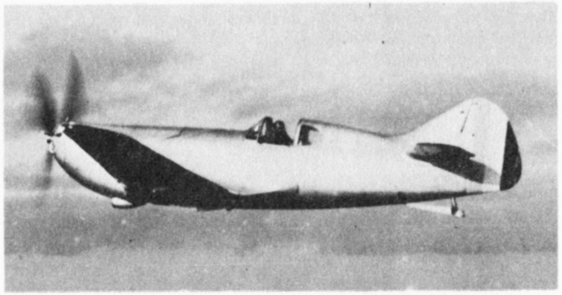
and 2nd Escadrilles, GC II/3 the 3rd and 4th and GC III/3 the 5th and 6th.

There were other types of fighter unit which can be mentioned briefly. The chief reserve formations were the Escadrilles Régionales de Chasse (ERC), each Groupe Aérien Régional de Chasse (GARC) comprising two such units. At the start of World War 2, the reserves were equipped with outmoded types such as the Nieuport-Delage Ni-D 629 and Dewoitine D 501, but as new aircraft became available these units became fully-fledged Groupes de Chasse. For example, ERC 1/561 and 2/561 equipped with the Bloch MB 151/152 in January 1940 became GC II/10.

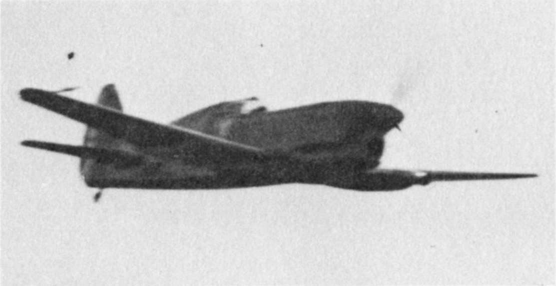
The night fighter units were designated similarly to the day-fighting Groupes de Chasse: Groupe de Chasse de Nuit (GCN) I/13 comprised Escadrilles de Chasse de Nuit (ECN) 1/13 and 2/13.

The German invasion of France and the Low Countries in May 1940 resulted in the creation of a number of makeshift units for the defence of certain industrial areas and air bases in the rear, these being known as Escadrilles de Chasse de Défense (ECD) and Patrouilles de Protection. Their ad hoc nature, and the lack of official records, make it difficult to be precise about them, but an average establishment was 5–6 aircraft and about 10 pilots. Most were equipped with the major types of fighter described in this volume, but some had the outmoded Dewoitine D 500/501 or one or two Koolhoven FK 58s.

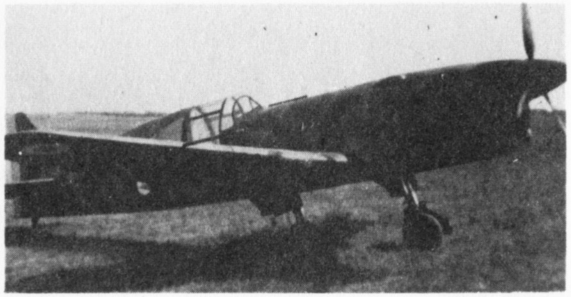
Only three ECDs are known to have been numbered, the remainder had their base as part of their title. The following place names are known to have been the bases of Escadrilles de Chasse de Défense or Patrovilles de Protection:



The best French fighter in service at the time of the German invasion, in May 1940, was the graceful Dewoitine D 520. The first prototype, the D 520-01, seen on its second flight, on 8 October 1938, was not so elegant. Production aircraft were 20in. longer and featured detail refinements (via the author)



The Caudron C 714 lightweight fighter was developed as a private venture and the prototype, shown above, first flew in the Summer of 1938. One hundred and twenty were on order in January 1939, to Contract 1646/8, but this was reduced to 83 in September 1939. Six were sent to Finland early in 1940 and in May Groupe de Chasse I/145, a Polish-crewed unit, was equipped with the type. After one week's operations starting on 6 June, GC I/145 had suffered such severe losses that it was disbanded, having scored 12 confirmed and two probable victories for the loss of about 20 aircraft (via the author)



A production C 714 (Dr Rivière)

Angers; Bordeaux-Mérignac; Bouguenais; Bourges; Caen; Cazaux (known as ECD 372); Chartres; Châteaudun; Châteauroux-La Martinerie; Cognac; Dijon; Etampes (known as ECD 2/55); La Rochelle; Romorantin; Salon-de-Provence; Toulouse; Tours (known as ECD 1/55); and Villacoublay. Many of these units made use of Polish pilots and two special Polish formations can be added to this list: the Groupe de Chasse de Marche Polonais, based at Lyons-Bron; and the Patrouille de Protection, at Salon-de-Provence, with FK 58s.

Some 100–120 aircraft are thought to have been operational with these units, but their influence was limited because most of their pilots had little or no training in the art of air-to-air fighting. No official results for the ECDs were ever released, and estimates of their total number of victories range between 15 and 20.

The following ancillary formations are mentioned in the text and should be noted: the Centre de Réception des Avions de Série (CRAS), at Villacoublay, which accepted production aircraft from the manufacturer; Entrepôt de l'Armée de l'Air 301 (EAA 301), a storage unit at Châteaudun; and the Centres d'Instruction de Chasse (CIC) operational training units.

The Aéronavale

The French Navy possessed a small air arm, known as the Aéronavale, which fulfilled that service's aviation requirements such as defence of naval shore bases and land- and sea-based reconnaissance. At the outbreak of World War 2, the Aéronavale possessed few modern aircraft and none of these were interceptor fighters. The most effective aircraft in its inventory was the Latécoère 298 torpedo-bomber floatplane, although dive-bombers, in the form of Loire-Nieuport LN 40s and "Foreign Aid" USA-built Vought-Sikorsky V-156s, were beginning to enter service.

The Aéronavale did not begin to receive modern fighters until the Air Force handed over some Potez P 631s and Bloch MB 151s in the Spring of 1940. Just before the Armistice, the first Dewoitine D 520s were made available to the Aéronavale.

The basic operational unit for the Aéronavale fighters was the Escadrille, there being five by the time of the Armistice. These each had a strength of about 12 aircraft and were numbered AC1 to AC5. After the Armistice, two remained but their designations were reversed to 1AC and 2AC.

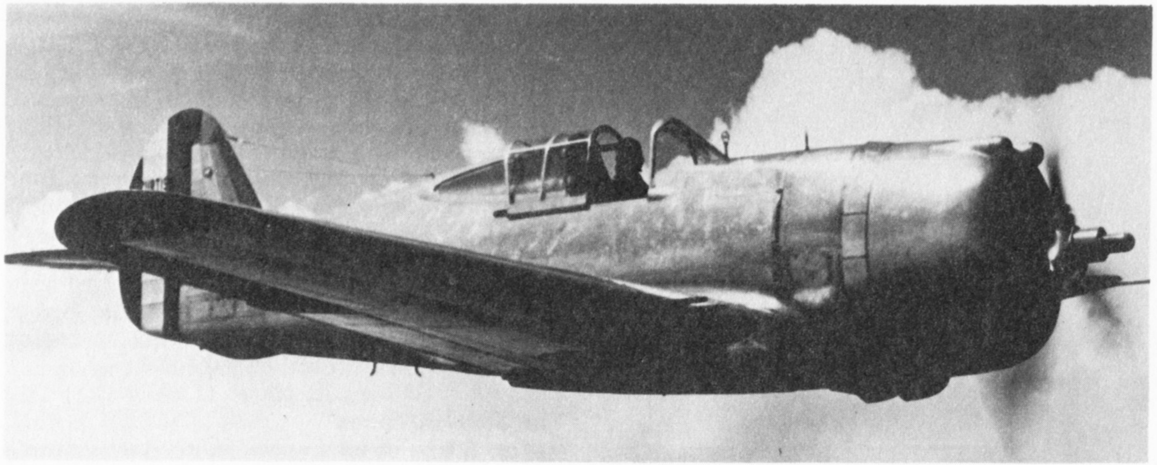
Aircraft strength in September 1939

The numbers of aircraft of all kinds available to the French and Germans at the outbreak of World War 2 were very similar. However, whereas the German Air Force had about 3,750 first-line aircraft at that time, the French had only about 1,200 modern aircraft, including 826 fighters, and many of these were unready or not completely suitable for front-line use. The operational units also had over 1,500 obsolete aircraft—whose designs mostly dated from the early-1930s—including some 400 fighters (of the Dewoitine D 371, D 500/501/510, Loire 46 and Spad 510 types), The 800 antiquated aircraft in reserve included Nieuport-Delage Ni-D 629 fighters.

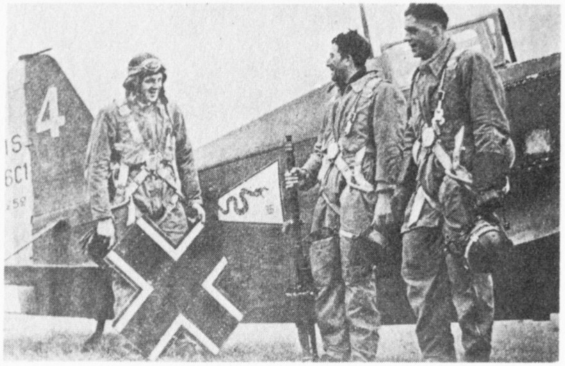
As 1939 drew to a close, the situation looked little better. The operational units had about 1,400 aircraft, of which less than 500 were considered modern. There were 16 front-line fighter units (Groupes de Chasse) equipped with the MS 406 and Hawk 75A and six non-combat-worthy units with the D 510 and P 630. The non-fighter units in Metropolitan France included 25 Groupes de Bombardement, 14 Groupes de Reconnaissance, and about 45 army co-operation units.

The main hope for the French was that the Germans would not attack the country directly for at least a year—in fact, French military aviation promised to be a force to be reckoned with by 1941. In addition to domestic developments, large numbers of aircraft had been ordered from the USA. The home-developed products in the pipeline were of excellent calibre and the first of these, the Dewoitine D 520, began to enter service in the Spring of 1940. The Arsenal VG 33 single-seat fighter was expected to enter service in the late Summer of that year along with the Amiot 351 series of bombers, while the more distant future promised such types as the formidable Sud-Est SE 100 heavy fighter and attack aircraft. Among the United States' equipment on order were the Curtiss H81 (RAF named Tomahawk) for the Air Force and the Grumman G-36A (Royal Navy named Martlet) for the Aéronavale. Re-equipment Plan VI of April 1940 foresaw three main types of first-line fighter by 1942: the D 520 series, VG 33 series and H81.

Time—the one commodity that could not be bought—finally ran out on May 10, 1940, when the Germans launched their invasion of France and the Low Countries. The preceding "Phoney



Like Britain, France turned to the USA for combat aircraft in 1938. Large numbers of Curtiss Hawk 75A fighters were ordered and the type served very well in 1939-40 (via the author)



Pilots of GC I/3, 1st Escadrille, celebrate the downing of a German aircraft late in 1939. The aircraft in the background is MS 406 No. 252 (C-J. Ehrengardt)

War" period had been useful for the French in evaluating their own and the enemy's potential. The French Air Force had flown 10,119 operational sorties in the forward Army Zones and recorded 88 confirmed victories, of which 60 per cent. were Messerschmitt Bf 109s, for the loss of 74 aircraft, including 55 reconnaissance aircraft. The first "aces" were beginning to make their appearance—Sergeant Sales of GC II/5 scored five confirmed victories during the pre-invasion period.

The French Air Force had a total of 1,501 aircraft in first-line service on May 10, 1940, including 784 modern fighters. Unfortunately the targets set by Plan V had not been met: with 24 Groupes de Chasse (22 operational), the fighter strength was two Groupes below that planned, and bomber, reconnaissance and army co-operation forces were similarly below strength. The Aéronavale had two operational fighter Escadrilles in Northern France and three working-up in the Midi.

The operational French Air Force fighter units on May 10, 1940 were as follows (by Groupement, which corresponded approximately to the RAF Group):

Groupement 21 with headquarters at Chantilly—GC I/1 (MB 152); GC II/1 (MB 152); GC III/3 (MS 406); GC II/10 (MB 152); and GC III/10 (MB 152).

Groupement 22 with HQ at Velaine-en-Haye—GC I/2 (MS 406); GC II/4 (Hawk 75A); GC II/5 (Hawk 75A); GC II/6 (MS 406); and GC I/8 (MB 152).

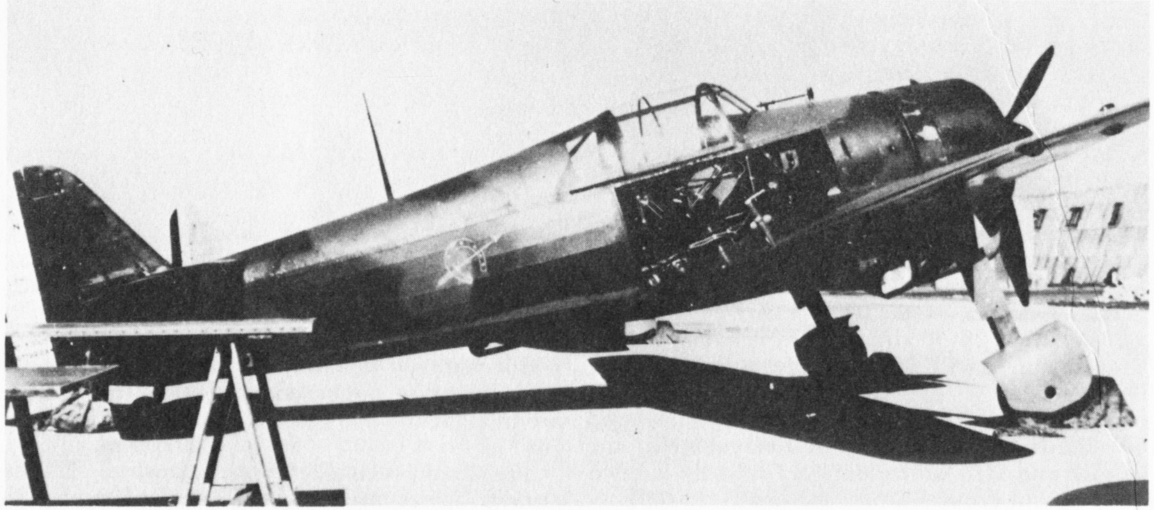
Groupement 23 with HQ at Laon—GC II/2 (MS 406); GC I/5 (Hawk 75A); GC III/7 (MS 406); and ECMJ 1/16 (P 631).

Groupement 24 with HQs at Dijon and Lyons—GC II/7 (MS 406); GC III/6 (MS 406); GC I/6 (MS 406); GC II/3 (MS 406); GC I/3 (D 520); GC II/9 (MB 152); and GC III/9 (MB 151).

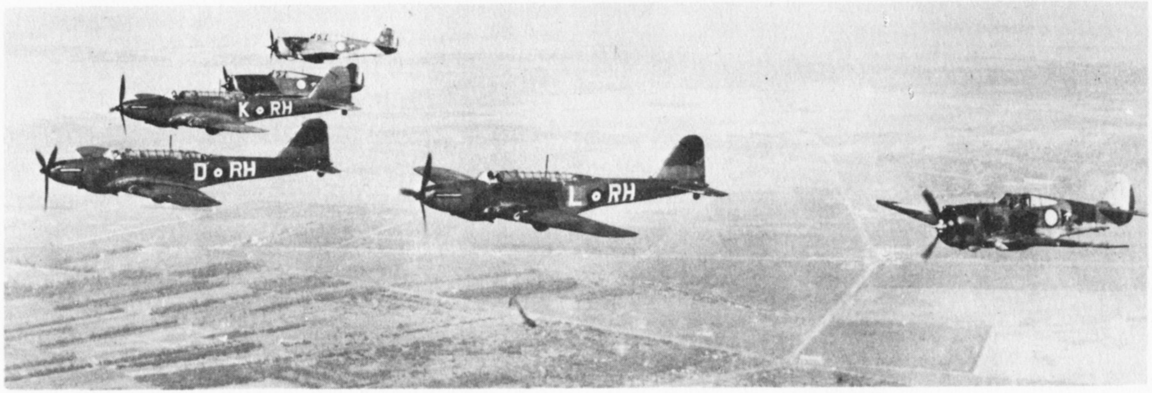
Groupement 25 with HQ at Aire-sur-la-Lys—GC III/1 (MS 406); III/2 (MS 406); GC I/4 (Hawk 75A); and GC II/8 (MB 152).

In addition there were the night fighter units: ECN 1, 2, 3, and 4/13 made up the Groupement de Paris, with HQ at Paris; and ECN 5/13 was the Groupement de Chasse de Lyon, with HQ at Lyons.

Although it is not intended to give complete details of all the subsequent fighting, it should be noted that the Allied losses on the first day of the invasion were much less than is generally believed, despite attacks on 47 airfields—33 of them in the Army Zone. In the French Northern Army area, only four aircraft were destroyed beyond repair and 30 damaged; while in the Eastern Army



France ordered 50 Koolhoven FK 58 fighters at the end of 1938, these being intended for use in colonial territories. Deliveries stopped in September 1939, after some 18 had been handed over, and the FK 58s were used for training in France (Dr Rivière)



Anglo-French collaboration—Curtiss Hawk 75As of the 1st Escadrille GC I/5 escort Royal Air Force Battle light bombers in the Spring of 1940 (Imperial War Museum)

area, 16 aircraft were destroyed and 10 damaged. The following days' attacks and air combats took their toll, however, but the most serious effect was on the French administrative "tail".

The battle on the ground went badly. Indeed, some military authorities feel that the breakthrough by the German forces at Sedan, within the first week, was decisive and final defeat was thereafter only a matter of time. They are probably correct, but this hardly excuses the disorganisation that ensued in the rear. But it became painfully obvious to the men of the operational squadrons. Reinforcement personnel and aircraft were slow in being brought to the battle areas and units sometimes found that an airfield they had left only an hour earlier, on a sortie, was being evacuated (or had been evacuated) on their return, resulting in the need to abandon perfectly good aircraft simply for lack of aviation fuel.

Despite all this, the French Air Force did score some significant successes. During the period May 13–15, the fighter units scored some 143 victories in 854 sorties. The overall situation got steadily worse, however, and by the end of May the great retreat was well under way. The last major French success in the air was the riposte to the German "Operation Tapir", when the Luftwaffe lost 26–30 aircraft in attacks on Paris on June 5, with French losses of only 24 fighters. The chief source of French aircraft losses in the campaign was their use against well-defended German-held ground targets. For example, the GC I/6 and II/2 fighter units were badly mauled carrying out ground-attack missions.

Aircraft production carried on throughout all this—although the shortages of components still persisted—112 D 520s came off the production lines between June 1–25 but many of them lacked windscreens and brake parts. EAA 301, the base responsible for checking-out aircraft before their delivery to units, was cluttered with aircraft lacking small, but vital, parts. The "log jam" had not been cleared by the Armistice and the Germans found large numbers of new aircraft when they came to take a census afterwards.

The Armistice was not finalised until June 25 but for several days previously the French had been busy evacuating aircraft to North Africa in the hope that they would be denied to the enemy. Some 700 were counted on the airfields of Algeria, Morocco and Tunisia in July. When the French Air Force "froze" its movements under the terms of the Armistice, the fighter units were disposed as follows: in France—14 Groupes de Chasse (eight with Bloch MB 152/155s, five with MS 406s and one with D 520s) and six Potez P 631 Escadrilles; in North Africa—14 Groupes de Chasse (five with Hawk 75As, five with D 520s, three with MS 406s, and one with obsolete aircraft); and in Syria—one MS 406 Groupe.

The Italian Air Force joined the Germans in their attacks on France from June 10, but there was little serious air fighting between the French and the Italians. The Italians claimed 42 French aircraft destroyed. Their own losses are not known with accuracy—certainly not from official Italian records as yet published—although the French are thought to have given at least as good as they got.

The French Air Force, Aéronavale and anti-aircraft forces are officially credited with the destruction of 1,009 German and Italian aircraft during the period September 3, 1939 and June 25, 1940, during a total of 20,410 sorties. The Air Force claimed 935 confirmed "kills", including 355 German fighters and two-motor Bf 110s, 461 bombers and dive-bombers and 98 reconnaissance aircraft. This total represents some 27·1 per cent. of all the German aircraft engaged in Western Europe during the period and shows the damage inflicted on the Luftwaffe by the French Air Force during its valiant but vain struggle. German records indicate the loss of 1,469 aircraft up to June 25, 1940, including those lost to the British.

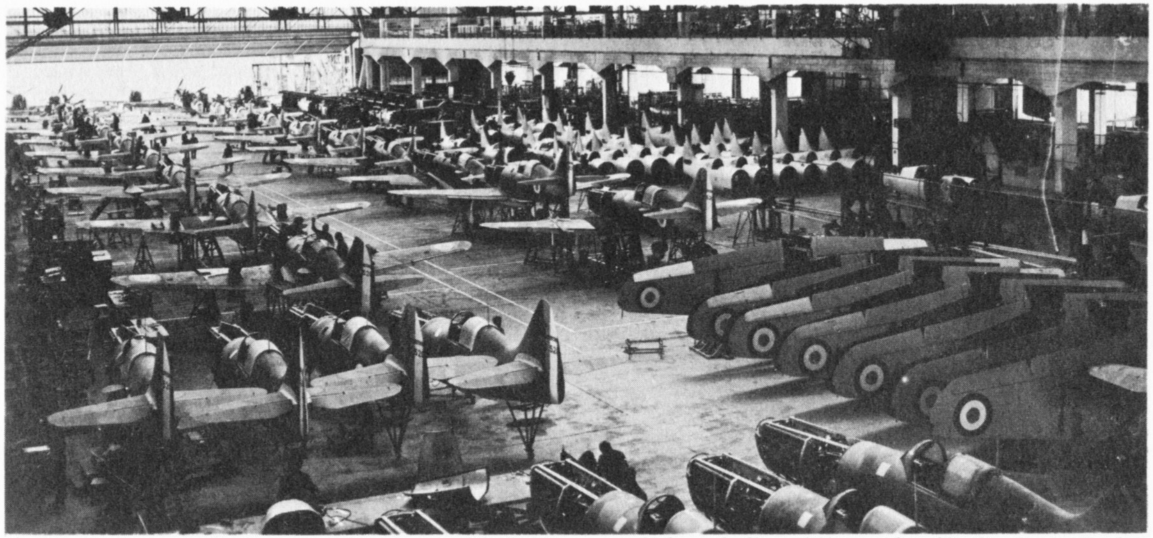
The French "aces"

The doyen of all French fighter pilots during the first year of the war was Lieutenant Edmond Marin la Meslée, who scored 16 confirmed and four probable victories under the French scheme of computing pilots' scores. It should be noted that where more than one pilot was involved in the destruction of an enemy aircraft each pilot involved was credited with a "kill", although only one enemy aircraft was listed as destroyed. Space precludes a lengthy list of the

What the well-dressed French fighter pilot was wearing in 1940. The illustration also shows details of the MB 152's gunsight and cockpit canopy

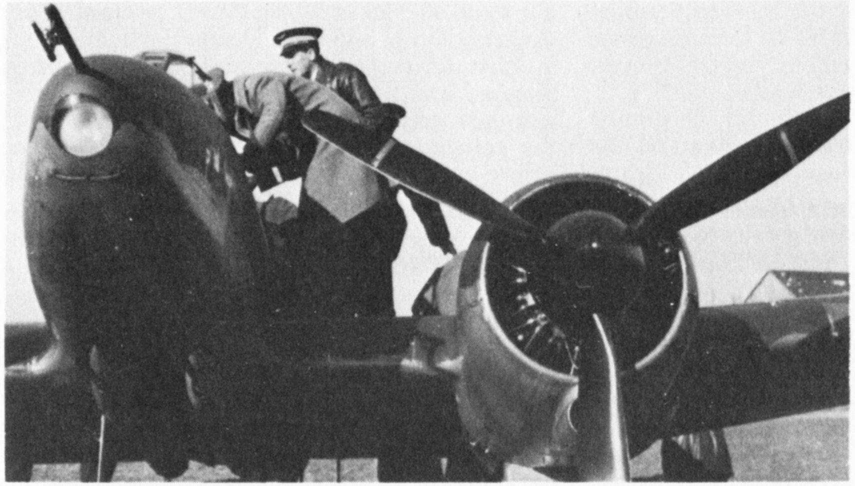
French "aces", although it is notable that among the 11 who scored 10 or more confirmed victories all but two were flying the Curtiss Hawk 75A.

The remaining 10 (after Marin la Meslée) on this list are: Lieutenant Michel Dorance, who like Marin la Meslée flew with GC I/5, with 14 confirmed and three probables; Adjudant* Camille Plubeau (GC II/4), with 14 + 3; Commandant Jean Accart (GC I/5), with 12 + 4; Commandant Alois Vasatko (a Czechoslovak with GC I/5), with 12 + 3; Adjudant Pierre Le Gloan (GC III/6), with 11 + 2; Sergent-Chef Edouard Le Nigen (III/3), with 11 + 2; Lieutenant François Périna (a Czechoslovak with GC I/5), with 11 + 2; Sergent-Chef Maurice Tallent (GC I/5), with 11 + 1; Sous-Lieutenant Georges Lefol (GC I/5), with 11 + 1; and Sergent-Chef François Morel (GC I/5), with 10 + 2. A further 70 pilots scored five or more confirmed victories.

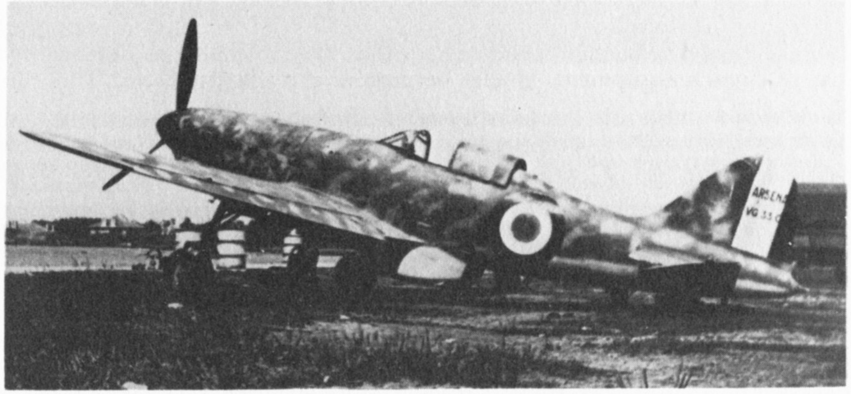


Above: *If only there had been more time! Production of the D 520 was at a high rate by June 1940, as evidenced by this photograph of the Toulouse-Saint Martin assembly line when halted by the Armistice* (Sud-Aviation)

Below: *Commandant Bertrou (who features in the D 501 photograph at the beginning of this chapter) shows his Potez P 631 to the Duke of Windsor (leaning over the cockpit) when the latter visited GC II/2 in March 1940* (Dr Rivière)



Below: *The Arsenal VG 33 was a promising single-seat fighter, which was just entering production at the time of the Armistice. Eight hundred and twenty VG 33s and derivatives were on order at that time (to Contract 2240/9), but only half a dozen were delivered to the Air Force. Armed with a 20 mm cannon and four 7·5 mm machine-guns, the VG 33 had a maximum speed of 347m.p.h. at 17,060ft* (Musée de l'Air)



The Armistice Air Force

Units of the Armée de l'Air were not disbanded immediately after the Armistice of June 1940 and such was the French anger at British raids at that time on certain French territories that the German-Italian Armistice Commission allowed the Vichy Government to retain combat aircraft. The official title of the Vichy French Air Force was the Armée de l'Air de l'Armistice (Armistice Air Force); but the Aéronavale did not change its name, although the units changed their designations.

The make-up of the Armistice Air Force fighter strength, as permitted in August 1940, was as follows:

France—six MB 152-equipped Groupes of day fighters and two night fighter Escadrilles with P 631s.

North Africa—two Hawk 75A and four D 520 Groupes (day fighters), plus one, and later two, Aéronavale Escadrilles with D 520s.

Senegal—one Hawk 75A Groupe and one D 501 Escadrille (day fighters).

Syria—one MS 406 Groupe.

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*Adjudant—French N.C.O. rank senior to sergeant-major.

There were 14 bomber Groupes, eight reconnaissance Groupes and two transport Groupes, plus several reconnaissance Escadrilles.

For the most part, the Armistice Air Force was not allowed to fly with loaded guns and fuel was limited. Only sufficient flying hours to keep the pilots' hands in were permitted. The normal French national colours were retained, but aircraft had additional white bands painted on the fuselage sides, although from 1941 onwards, aero-engine cowlings and tail units were painted with broad red and yellow stripes to proclaim France's "neutrality". An added refinement during this latter period was the appearance of diagonal tricolour bands above and below the aircraft's wings.

The major Armistice Air Force fighter actions were against the British raids on Mers-el-Kebir and Dakar in 1940, in Syria in 1941 and in North Africa in November 1942. This last affair marked the end of the Armistice Air Force, although the Armistice Commission relaxed its grip sufficiently in 1941 to allow the formation of three new fighter Groupes and approved plans to make the D 520 the standard day fighter. After the Allied invasion of North Africa, the Germans disbanded the Vichy Government air arm (on November 27, 1942) and seized no fewer than 1,250 aircraft. Many of these found their way into the service of Germany and its allies.

As a closing note, the Free French made little use of French equipment, chiefly because of the impossibility of obtaining spares. The revived French Air Force, which saw the light of day in the wake of the November 1942 invasion of North Africa, made more use of French material, although a spares problem developed in most cases. Little use of French aircraft was made in combat during 1943–5 and this book does not dwell on their career in the training schools of North Africa. The opportunity for a last fling on the part of the D 520 and other types occurred in France after D-Day, albeit on a miniscule level compared to the overall Allied effort. The French Air Force and Aéronavale had re-established their reputations, however—but not with French-produced aircraft.

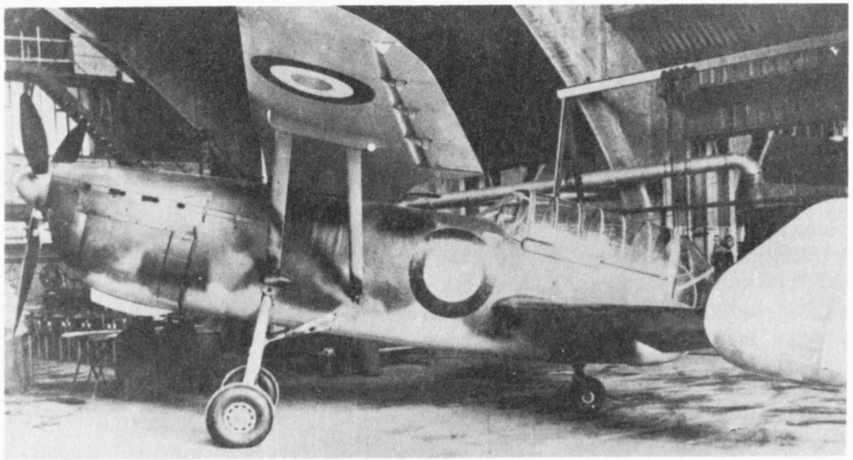
Camouflage and Markings

This is the most vexed question in any study of French aircraft of the World War 2 period and it has to be admitted that there is no way of resolving many of the problems encountered in this field. The study of photographs is unsatisfactory in the case of French aircraft because, depending on the type of film used, it is difficult to distinguish conclusively between certain colours. Human memory being what it is, even personal contact with survivors of 1939–40 cannot reduce the impact of the passage of thirty years. However, certain generalisations can be made.

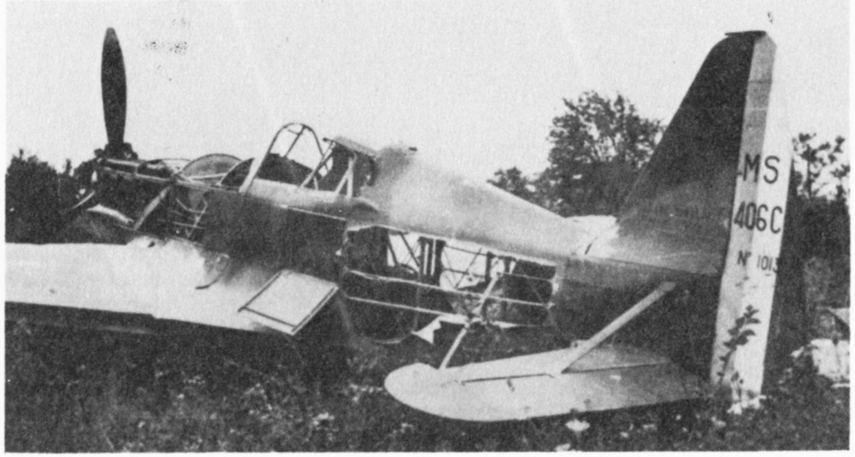
First and foremost, at no time did the French employ a systematic camouflage scheme on the British lines. The camouflage of French fighter aircraft became the order of the day in May–June 1939, although it was often used before that date. The colours were more or less standard during the period 1939–40. Upper surfaces were a mixture of medium grey (or dark grey-blue), dark Sienna Earth (known as "marron" in France), and dark green (tending sometimes to dark olive green). Sometimes a sand or beige shade was observed replacing one of the dark colours but much of the deviation from the three basic hues was probably the result of careless paint mixing. There was no clear dividing line between the upper surface colours. Under surfaces were usually pale grey or pale blue.

In principle, these colours were used with a matt finish but, since the 40–50 pounds of paint on a fighter resulted in the loss of precious speed, the ground crews often applied abrasive and "elbow grease" to put a certain amount of polish on the aircraft.

These colours were applied regardless of what region the aircraft was operating but after the Armistice, in the last months of 1940, the Armistice Air Force set new camouflage standards. The same colours as before were used in France, but some aircraft in North Africa received upper surfaces of grey and dark Sienna Earth and some in West Africa had upper surfaces of sand, dark Sienna Earth and dark green. Occasionally grey and dark green were seen. The division between the colours was much more pronounced than before and, locally at least, there were attempts



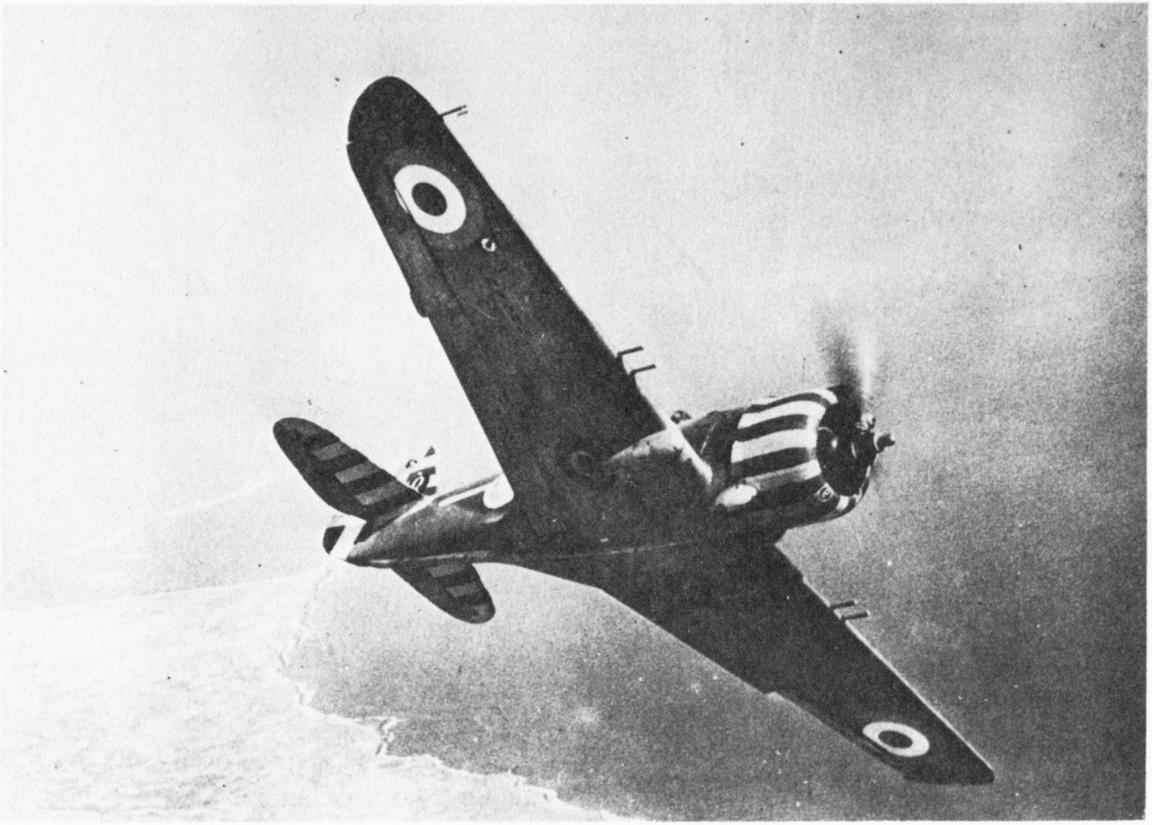
One of the odder designs under development in France in 1940 was the Arsenal-Delanne 10 two-seat fighter armed with a 20 mm cannon and two 7·5 mm machine-guns fiiring forward and two flexible 7·5 mm machine-guns, operated by the second crew member, for rear defence. The prototype first flew in October 1941 and the aircraft was later taken to Germany (via the author)



With defeat in 1940 came the occupying German forces, who found airfields covered in aircraft - both intact and wrecked. MS 406 No. 1013 was abandoned by the French in June 1940 and German souvenir hunters cut off the rear-fuselage fabric to take the French roundel and unit insignia

(Archives Botquin)

The Vichy Government was allowed to have its own air force, known as the Armistice Air Force. In 1941, all its aircraft were required to carry red and yellow bands on the engine cowlings and tail unit—officially to signify France's neutrality. To the French, the striping became known as the 'slave's livery'. It was being phased out at the time of the dissolution of the Armistice Air Force in November 1942 (ECPA)



at standardisation. The old practice of applying upper surface paint in irregular patches or bands died out in this period and the style tended towards that of the RAF. Reference has been made already to the use of white fuselage bands and, later, red and yellow striping on Armistice Air Force aircraft.

Aircraft used in North Africa, chiefly for training, after the Allied landings there, received upper surface schemes of dark green and dark Sienna Earth or, later, grey and dark Sienna Earth which closely resembled these of the Allies in form.

The French roundels were applied initially only to the upper and lower surfaces of the wings at the beginning of the war. The roundels were without border and above the wings they were only 30 cm (12 inches) in diameter; below the wings they were 80 cm (31·5 inches). The tricolour bands on the rudders did not fill the entire moveable surface at this time. During the Spring of 1940, the upper wing roundels were enlarged to the same size as those below the wings and the tricolour bands spread to fill the whole rudder.

Roundels on the fuselage sides of 80 cm diameter were introduced in the Spring of 1940; their position varied even on the same type of aircraft. During the German invasion of May–June 1940, it was often the practice to tone down the white of the roundels, usually with grey paint.

After the Armistice, it was customary to outline the fuselage roundels in white, these merging with the white bands. Later, in 1942, both the fuselage bands and roundels were ordered to be eliminated but this task was only partly carried out before the dissolution of the Armistice Air Force. Aircraft used in North Africa, post-November 1942, adopted the RAF practice of outlining fuselage and wing roundels in yellow. This was universal by 1945 and has since remained.

The subject of aircraft numbers and unit insignia is too complex to be dealt with here but production numbers and matricules militaires merit brief mention. Production numbers (not to be confused with constructors' numbers) represented a particular aircraft's place on the production line of its type. It was marked on the rudder beneath the aircraft's official French military designation:

CURTISS
H75-C1
No 35

Regrettably, here again, no system prevailed. MS 405 and 406 numbers ran consecutively, the former being Nos. 1–15 and the latter being Nos. 16 onwards. MB 151 and 152 numbers were intermingled and the P 630 and 631 were each numbered separately from No. 1 onwards. For the Hawk 75A, the numbers ran in separate consecutive batches from No. 1 onwards for the A-1 to A-3 versions, but started again from No. 1 for the A-4, which received the military designation H751-C1 rather than the simple H75-C1 of its predecessors. Prototypes were numbered 01, 02, and so on.

Matricules militaires were letter-three number combinations painted on the under surfaces of the wings to aid long-distance identification from the ground. For example, Y-846 was applied to the MB 152 No. 359. These were usually painted in black or white and bore no relationship to RAF serial numbers. Also, they were not allocated in any particular order. Indeed, different batches of the same aircraft type often received totally unrelated matricules militaires. Where known, they are listed with each aircraft type in the following text. The practice was dropped in March 1940, although aircraft already allocated such "codes" usually (but not always) kept them for a while at least. However, by 1942, they had all but disappeared. Theoretically, a particular matricule militaire corresponded to a particular production number, but anomalies occurred when an aircraft under repair received another's wing, or wings. For example, MS 406 No. 101 originally had the "code" N-417, but was carrying N-421 in May 1940.

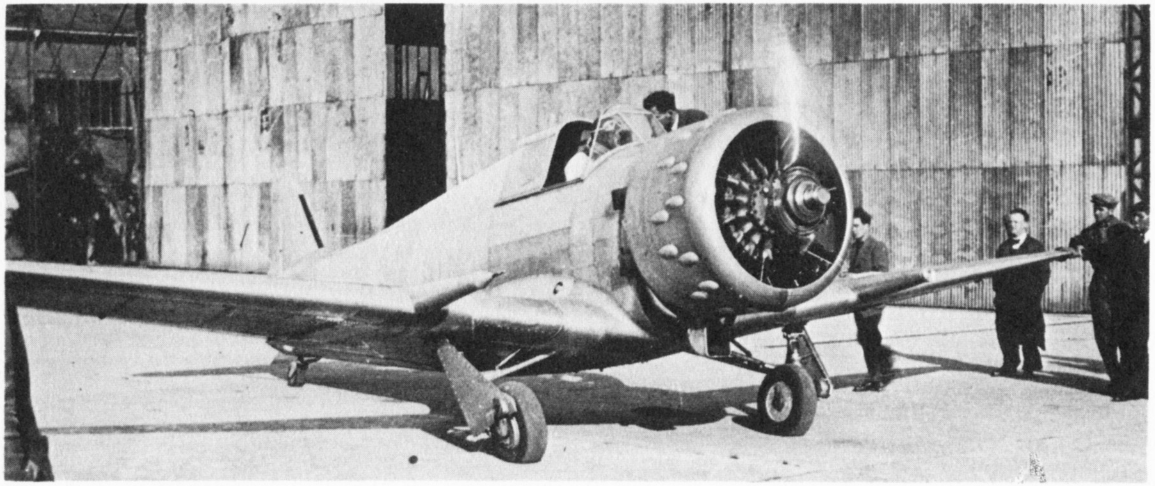
Bloch MB151-155

The story of the Bloch fighter series during World War 2 is the saddest of all of the French fighters because, but for the threat of war, it would probably never have gone into production. The breed had potential, manifested in the MB 157, but both the MB 151 and 152 were rushed into production. The resulting teething troubles wasted precious time and energies which might have been better devoted elsewhere.

The series had its origins in the Bloch 150 designed to meet the 1934 French fighter specification and to compete against the Dewoitine 513, Loire 250, Morane-Saulnier 405 and the Nieuport 161. Although issued in July 1934, the specification was not finally "frozen" until some 16 months later, November 1935, by which time the eventual winner—the MS 405—had already flown.

The Bloch MB 150 was an odd-looking fighter and construction of the first prototype—the MB 150-01 powered by a 930 hp Gnôme-Rhône 14 Kfs two-row radial—began at Courbevoie in September 1935 and was completed in the early Summer of 1936. During the course of its first attempted flight on July 17, 1936, the MB 150-01 failed to take-off and it was obvious that somewhere along the line the design calculations had been in error. The following month, after the MB 150-01 had been hastily modified, a second attempt was made but to no avail. With a certain amount of official encouragement further work on the prototype was shelved.

Nevertheless, early in 1937, and on a company-funded experimental basis, Avions Marcel Bloch resumed work on the design. They adopted a new mainplane of slightly greater wing area and replaced the original Bloch-designed main undercarriage located aft of the wing front spar with a Messier system installed ahead. These revisions brought about a successful first flight at Courbevoie on September 29, 1937. In October 1937, the engine was replaced by a Gnôme-Rhône 14N 07.



The Bloch MB 150-01, when first completed, was a curious looking aircraft; note the original Bloch main undercarriage. At the time of this photograph, the Summer of 1936, the engine was a Gnôme-Rhône 14 Kfs (J-M. Cuny)

In December, the MB 150-01* went to the CEMA (Centre d'Essai du Matériel Aérien), Villacoublay, for official flight trials, during which a maximum speed of 269·5 mph was recorded. More modifications then followed. A 940 hp Gnôme-Rhône 14N 01 engine was fitted and the wing span increased by four inches to 33·23 ft. Also, the carburettor air intake was lengthened and the two wing-mounted oil coolers were replaced by a single unit mounted centrally between the main wheel wells. Further performance trials at the CEMA in March 1938 resulted in the rudder area being increased slightly and a Gnôme-Rhône 14N 21 installed.

The career of the MB 150 seemed over at this point and, no doubt, in less troubled times the company would have gone back to the drawing-board and developed an improved design from scratch. However, production of the Morane-Saulnier MS 406 could not be expected to meet all the demands of the Plan V re-equipment programme, drawn up early in 1938, and calling for 940 modern fighters to be in service by April 1939. In fact, it was estimated that only 285 MS 406s could be completed by this date, being determined by the projected availability of the Hispano-Suiza 12Y inline engine. To fill the gap, the Air Ministry decided (1) to put the MB 150 into production at SNCASO, which had absorbed the Bloch factories under the nationalisation scheme, and (2) to order an American fighter—despite opposition from French aircraft industry sources—the Curtiss Hawk 75A (see Chapter 6) being chosen.

Although its development was incomplete and the MB 150 was not suited to mass production in its existing form, it was, nevertheless, the subject of a provisional order in April 1938; not least because the Gnôme-Rhône 14N powerplant was readily available. This contract called for 25 pre-production aircraft and 450 production aircraft; the latter subject to satisfactory development progress. A firm contract, 308/8, was placed at this time for three improved prototypes which used the same basic airframe. One was to be powered by the Gnôme-Rhône 14N 25, one by the Pratt & Whitney R-1830 Twin Wasp and another by the Wright R-1820 Cyclone. Further radials were also studied for possible installation including the Gnôme-Rhône 14P and the Hispano-Suiza 14AA.

The provisional contract, 385/8, envisaged the completion of 300 Bloch fighters by April 1939, although in September 1938 this target was reduced to 206.

The first requisite was to redesign the MB 150 for mass-production and this was quickly done, a pattern aircraft, the MB 151-C1, being completed by the SNCASO at Courbevoie and first flown on August 18, 1938. The wing of the MB 151-C1 was completely redesigned, with increased span (34·56 ft) and reduced chord giving a wing area of 161·5 sq ft. An 870 hp Gnôme-Rhône 14N 11 was enclosed in a neat cowling, and the oil

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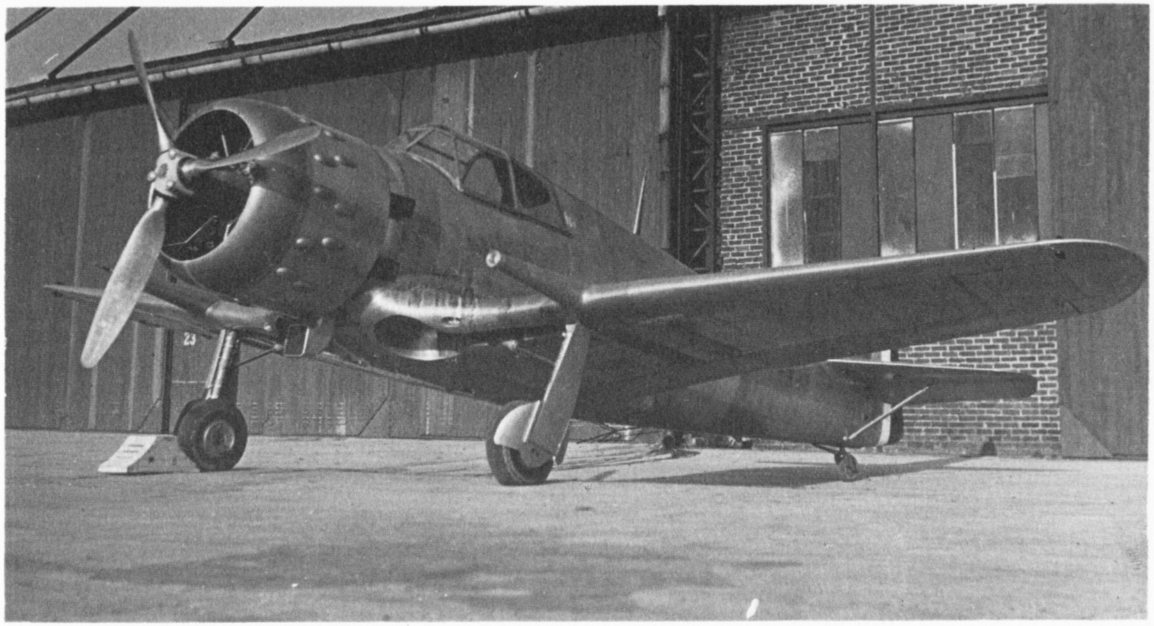
*It has been recorded that the prototype was redesignated MB 150-01M, signifying modified, but this does not appear to have any official basis.

Right: *By the time of its first flight in September 1937, the MB 150-01 looked more normal. The wing area was increased and a Messier landing gear had been fitted* (via the author)



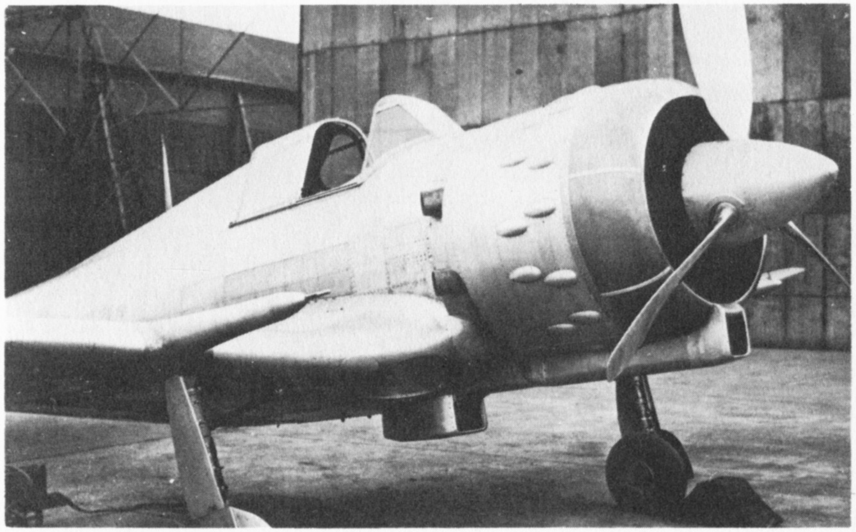
radiator was located under the port wing. Additionally, the MB 150's tail wheel was replaced by a skid, and four 7·5-mm MAC 1934 machine-guns were mounted in the wings. Shortly after the first flight, the MB 151-C1 went back to the factory for modifications which included an enlarged tailplane, lengthened engine mounting and a Gnôme-Rhône propeller in place of the original Chauvière unit. After tests at the CEMA in September 1938, the oil cooler was enlarged and ground firing trails were carried out at Cazaux during the following month.

Meanwhile, work had been proceeding on the pre-production batch of 25 MB 151s—the "productionised" MB 150—but was seriously delayed by problems encountered with the MB 151-C1, involving the oil cooler and pitching instability in high-speed flight. Extensive tests of different oil coolers and various flap and tailplane arrangements failed to cure these problems and the MB 151-C1 failed to attain its estimated maximum speed of 300 mph. In addition, range and endurance were poor.

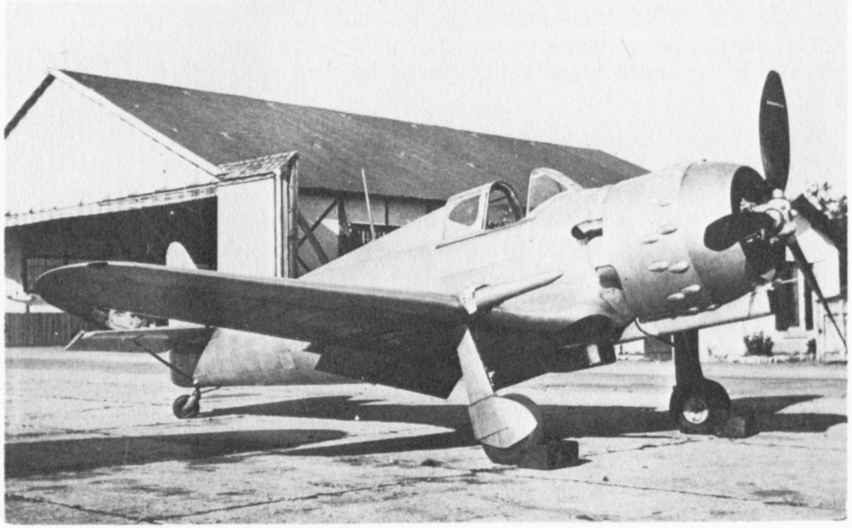
Although a pre-production aircraft was later tested with an extra fuel tank in the rear fuselage, the MB 151 and 152 both suffered from these performance shortcomings which were not rectified until the appearance of the MB 155.

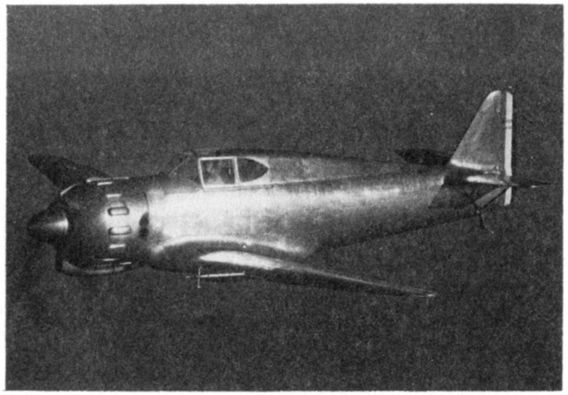
The provisional order placed in April 1938 was confirmed the following September and changed slightly to total 432 aircraft, including pre-production aircraft, despite the troubles encountered by the MB 151-C1. The European

Below-left: *Further modifications were incorporated by the end of 1937. Two engine changes had led to the 940hp. Gnôme-Rhône 14 N01, the wing span was increased slightly, the carburettor air intake was lengthened and the two wing-mounted oil coolers were replaced by a single central unit* (J-M. Cuny)



Below: *The MB 150-01 attained its final form in the Spring of 1938. The engine cowling was improved in shape and the vertical tail surface was enlarged* (J-M. Cuny)





Changes to suit the Bloch design to mass production necessitated the construction of a pattern aircraft, the MB 151 No. 1, which first flew on 18 August 1938, piloted by R. Blanc (via the author)

political scene had become particularly ominous and it was hoped that the problems would soon be cured—a false hope, as the reader will judge. Of the 432 ordered, 144 were to be MB 151s, based on the MB 151-C1 and powered by the Gnôme-Rhône 14N 35 radial, and the remaining 288 were to be MB 152s; half to be powered by the 14N 25 and half to be powered by the 14N 49 aero-engine. They were officially known as the Bloch 151-C1 or 152-C1 and allotted the matricules militaires Y-488 to 919 in parallel with the production numbers 1 to 432. The production numbers were allotted indiscriminately to MB 151s and 152s—for the record the MB 151s were Nos. 2, 4–8, 12–15, 21–90 except 41 and 43, 92–94, 96 and even numbers up to 112, 116, 118, 346 and even numbers up to 432 except 352 and 412.

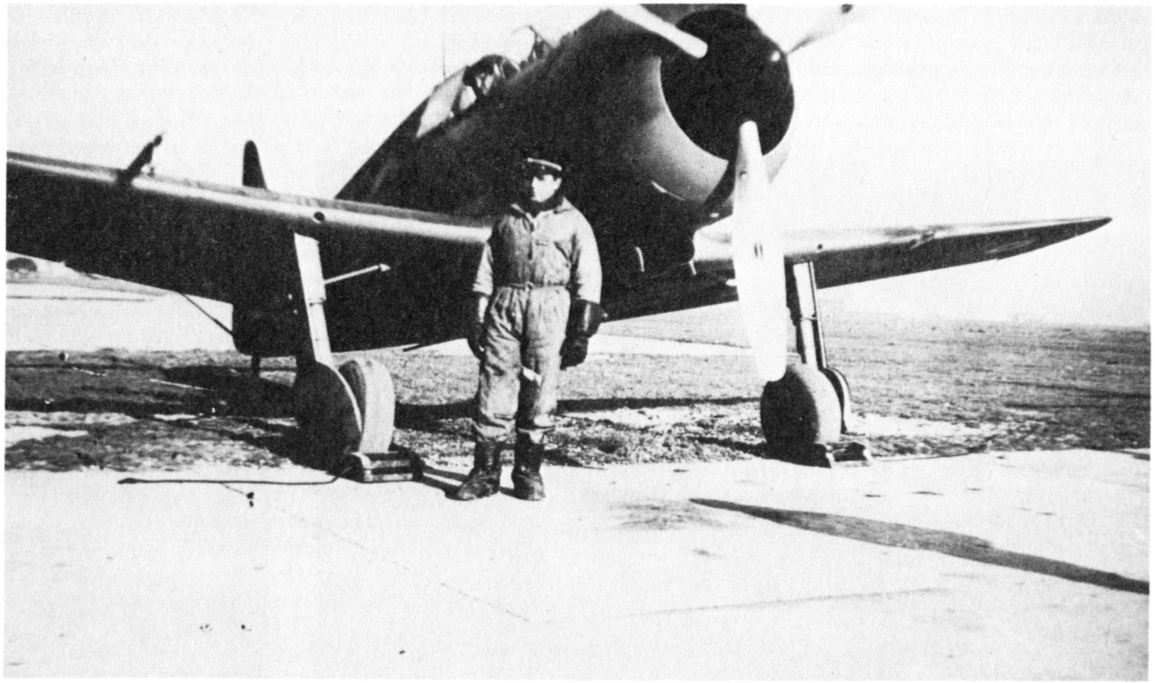
While initial testing of the MB 151-C1 was taking place, the first "improved" prototype to Contract 308/8 was nearing completion at Courbevoie with a 1,030 hp Gnôme-Rhône 14N 21 which gave it an estimated maximum speed of 323 mph at 16,400 ft. This was the first prototype of the MB 152 and was completed in October 1938. Known as the MB 152-01, it had the production number 433 and first flew on December 15, 1938.

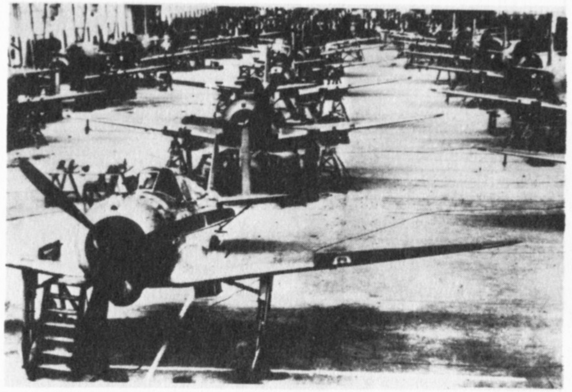
The MB 152-01 was fitted with the Gnôme-Rhône 14N 25 engine, intended for production aircraft, in January 1939 and the following month went to the CEMA for evaluation. A shortage of metal variable-pitch propellers was anticipated and the MB 152-01 was tested at the CEMA with two fixed-pitch types, a 3-blade Gnôme-Rhône and a 4-blade Chauviére design. On its return to the SNCASO in March, various modifications were made, chiefly to the horizontal tail surfaces, the oil cooler and exhaust system. After a flight check, the centre-of-gravity was altered and a spinner fitted to the propeller. The most serious problem with the MB 152-01 involved cooling as with the MB 151-C1, and this prevented the aircraft being flown at full throttle so that the top speed was limited to about 290 mph. Different engine cowling apertures and propellers were tested between April and July 1939, in an effort to solve the problem. So as not to delay production deliveries still further it was decided to adopt the largest cowling air entry previously tested (39·3 inches diameter) for initial production aircraft. This more or less solved the cooling problem, but the resulting drag reduced performance to a figure well below that required by the Specification.

While development of the MB 151 and 152 progressed, production preparations went ahead rapidly at the SNCASO. Both types were intended to carry an armament of two HS 404 20-mm cannon and two 7·5-mm MAC 1934 machine-guns in the wings but, in the event, delays in cannon production meant that all MB 151s were armed with four MAC 1934 machine-guns. Incidentally, the cannons were meant to take 60 rounds per gun, but usually 50-round drums were used, containing only about 45 shells to prevent blockages. The MB 151's machine-guns often only had 300 rounds per gun while those of the MB 152 usually held 500 rounds per gun.

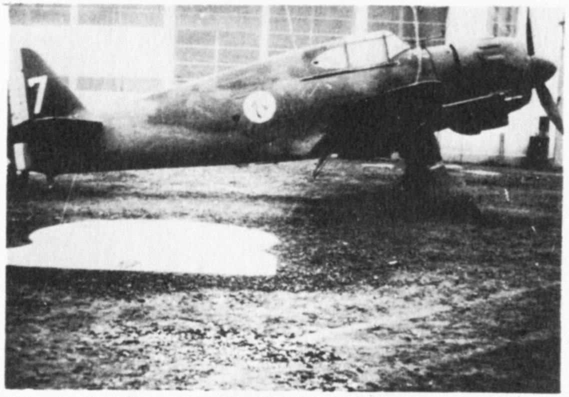
It was decided that while most of the pre-production aircraft were to be assembled at Courbevoie, the rest of the order was to be divided between Châteauroux-Déols (217 aircraft) and Bordeaux-Mérignac (196). A few aircraft produced in December 1939 and January 1940 were actually assembled at Courbevoie, but up to this time all even-numbered airframes came from the Châteauroux assembly lines and the others from Bordeaux. However, from January 1940 all Bloch fighters were assembled at Châteauroux.

The MB 153 was powered by a Pratt & Whitney Twin Wasp radial, note the air intake above the engine, and first flew on April 8, 1939. It is seen here at Villacoublay in March 1940 (J. M. Cuny)

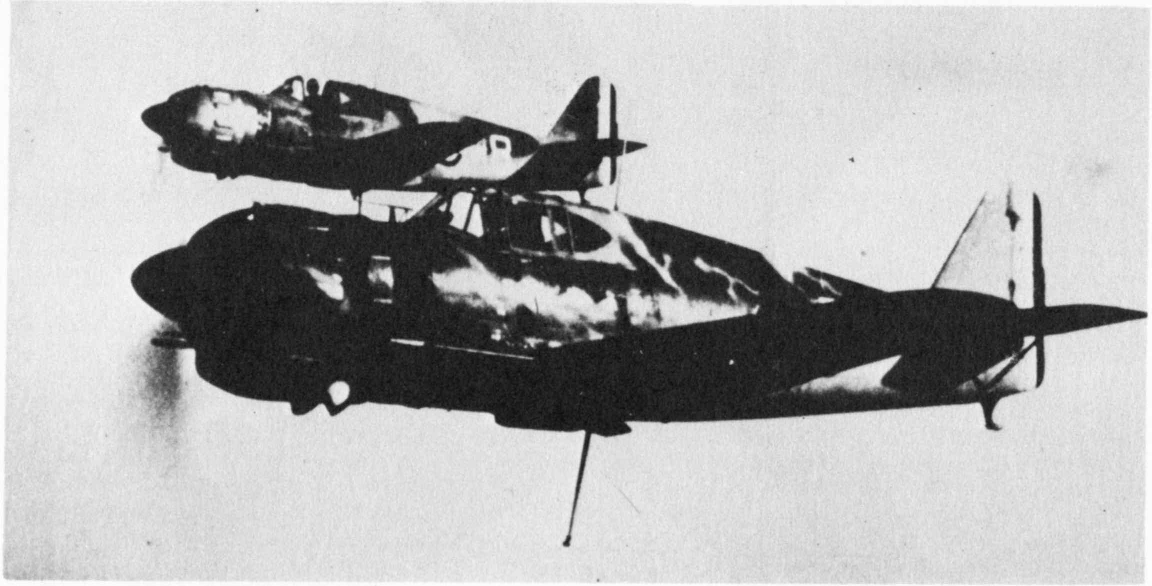



The Bloch MB 151 and 152 in production at Châteauroux-Déols in 1939 (Archives Botquin)

A Bloch MB 151 of Groupe de Chasse II/1 (C-J. Ehrengardt)


MB 152 No. 134 serving with GC I/1; the figure 7 is white (Archives M. Cristesco)

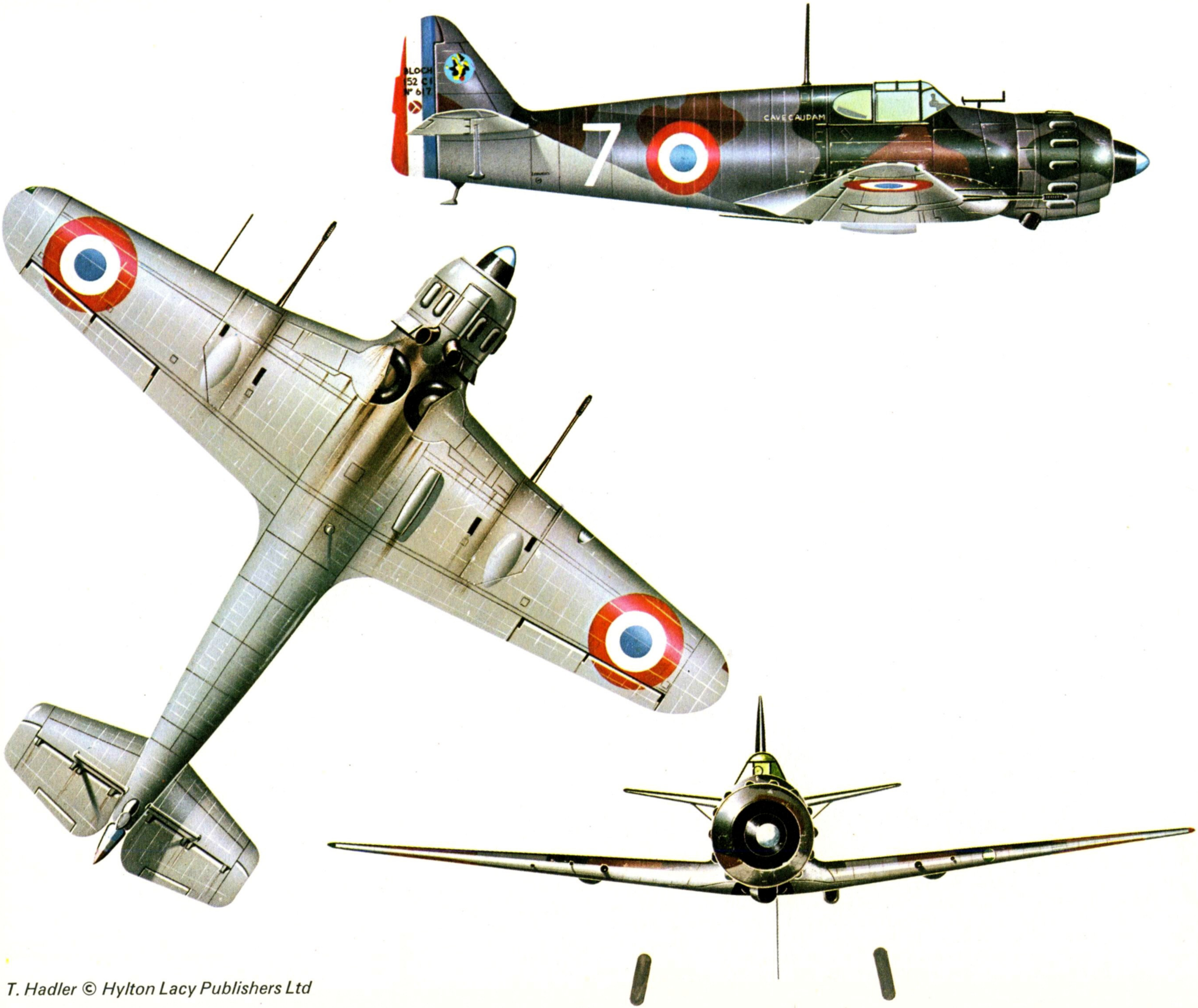
MB 151 No. 2 first flew in December 1938 and at this time it was planned to introduce the Bloch fighters to service with the 3rd Escadre de Chasse (GC I/3 and II/3, based at Dijon-Longvic) in March 1939. The delay in getting MB 151 No. 2 flying had been caused by all the troubles with the MB 151-C1—which although not marked with a production number counted as the first pre-production aircraft. But it was obvious from flight tests that the MB 151s and 152s coming off the production lines were also failing to meet requirements. The first aircraft to be delivered to the French Air Force (MB 151 No. 4) was not taken on charge until early March and re-equipment of the 3rd Escadre was postponed until May. Even by this latter date, only 22 MB 151s and 152s had been completed, while the Air Force had taken only 10 on charge, including six MB 151s. Worse was to come.


Two MB 152s of GC II/1, 3rd Escadrille, in 1940 (Dr Rivière)

Official evaluation of the first few production aircraft at the CEMA, Villacoublay, and the CEAM (Centre d'Expériences Aériennes Militaires), Rheims, showed them to be quite unsuitable for combat and the tailplane was held to need redesign. Thought was given to cutting back production of the Bloch fighters but, finally, it was decided to store for subsequent modification the first 157 aircraft at EAA 301, Châteaudun. The SNCASO was instructed to modify all subsequent aircraft before delivery. The changes involved the fitting of new horizontal tail surfaces and the incorporation of a trim-tab on the rudder. Further, it was decided that the MB 151 would not be used for combat, but solely for training and familiarisation purposes; although, ironically enough, it was made available for export. Greece had been attempting to order the MS 406 but was persuaded, early in 1939, to take 25 MB 151s instead.

During May 1939, it was announced that an MB 152 had achieved a maximum speed of 329 mph during performance trials and was thus up to Specification, as a result of which a provisional order for a further 100 MB 152s, placed late in 1938, was confirmed. These aircraft were to be delivered between November 1939 and April 1940, when it was hoped that most of the original 432 on order would have been handed over to the Air Force. In fact, the MB 152 performance trials' results were incorrect. But not until later was it revealed that the recorded speed was too high because of the use of "faulty measuring equipment". It was a disquieting incident.

The 3rd Escadre re-equipped with the MS 406 in June 1939, because of the continued slowness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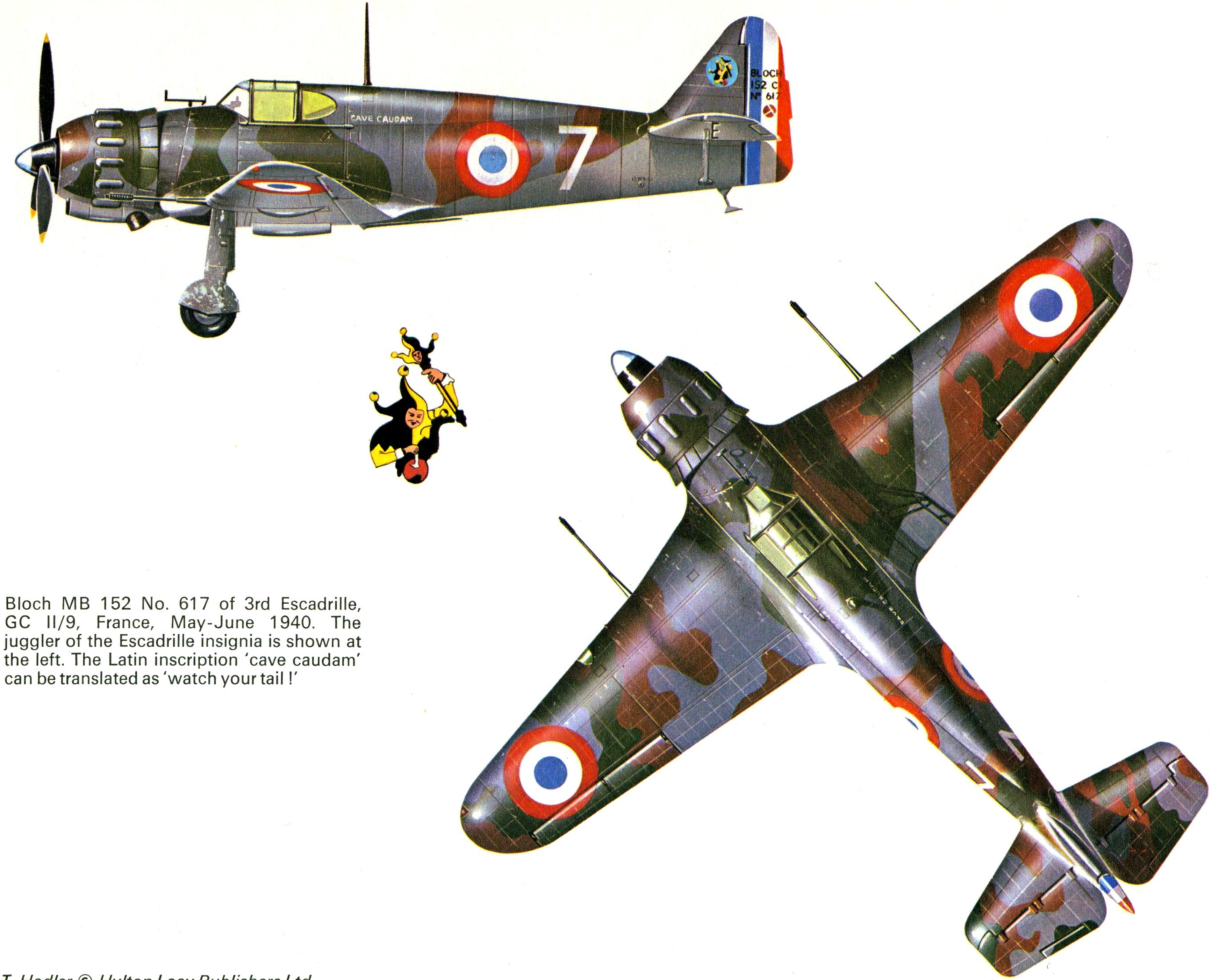
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Bloch MB 152 No. 617 of 3rd Escadrille, GC II/9, France, May-June 1940. The juggler of the Escadrille insignia is shown at the left. The Latin inscription 'cave caudam' can be translated as 'watch your tail !'

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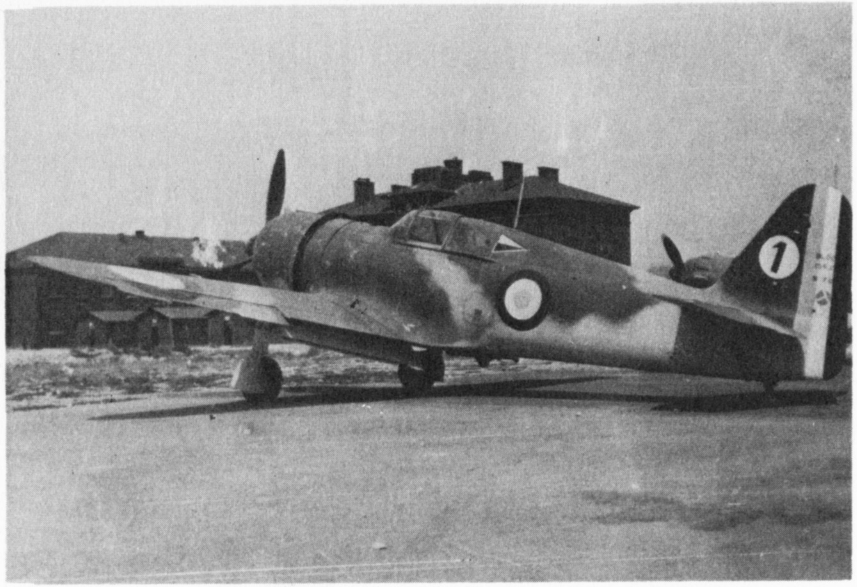
Pilots of GC II/9, 3rd Escadrille, pose for the camera before leaving on a mission from Clermont Ferrand Aulnat in June 1940 (Dr Rivière)



One of the few MB 155s delivered before the Armistice—serving with GC II/8, 4th Escadrille (Camouflage Air Club)

of MB 152 deliveries and it was decided to introduce the Bloch aircraft to service with GC I/1, based at Etampes-Montdésir. The first deliveries were made in July 1939 and all 24 aircraft initially equipping the 1st Escadre were powered by Gnôme-Rhône 14 N25 engines driving three-blade Gnôme-Rhône 2590M propellers whose pitch was only adjustable on the ground.

The mobilisation on August 27, 1939 was the occasion of the Bloch fighters' ultimate humiliation—the MB 152s of GC I/1 were withdrawn from service and the unit went back to using its old Dewoitine D 510s for training. In order to establish the minimum modifications necessary to make the MB 152 operational, a special test squadron (Escadrille d'Expérimentation) was formed at the CEAM, Rheims, in August; and on mobilisation this unit moved to Orléans-Bricy.

The outbreak of the war meant that the French Air Force needed all the aircraft it could get and, despite all the troubles with the Bloch fighters, Contract 2405/9 was placed in September 1939 for an option on 1,725 MB 152s or derivatives, including 690 firmly ordered. This was subsequently modified early in 1940 by Contract 2453/9, which superseded all those previously placed. The new Contract that included the original order for 144 MB 151s be reduced to 140, the last four being replaced by four MB 152s with production numbers 497–500; that assembly work on 61 MB 152s (Nos. 436–496) be halted because of the shortage of Messier undercarriages (the airframes to be used as spares); also, that only MB 152s from No. 501 onwards (to No. 699) were to be classified as combat-worthy ("bon de guerre"); and, finally, that 400 of an improved version, to be known as the MB 155 were to be ordered with production numbers 701 to 1100.

The 140 MB 151s built were to be allocated as follows: 85 for the French Air Force; 30 for the French Navy (Aéronavale); and 25 for export to Greece. In the event, not all the Greek MB 151s were delivered.

A total of 249 MB 151/152s had been completed when the war broke out and 123 of these had been delivered to the Air Force—95 being stored without propellers. Most of the remainder were "flyable" but lacked radios and/or armament. By January 10, 1940, the total number accepted had risen to 412, but over half were either not in flying condition or had only provisional propellers. Deliveries of MB 152s fitted with Gnôme-Rhône 14N 49 engines had begun in October 1939 and these aircraft had the definitive 30-inch diameter engine cowling for the type, a redesigned exhaust collector copied from that of the Curtiss Hawk 75, increased oil radiator cooling area, and a heating system for the carburettor and armament. The first combat-worthy aircraft, No. 501, fitted with a further re-designed tailplane and cleared for combat on delivery, was tested at the CEMA, Orléans-Bricy, in March 1940 and these were rushed to the units operating the MB 152 as quickly as they became available.

It will be recalled that two other improved prototypes were ordered to Contract 308/8, besides the MB 152. They were the MB 153, powered by a 1,200 hp Pratt & Whitney R-1830-S3C-G Twin Wasp 14-cylinder two-row radial and the MB 154, powered by a 1,200 hp Wright R-1820 Cyclone 9-cylinder radial.

The MB 153-01 prototype used airframe production number 434 and made its first flight at Villacoublay on April 8, 1939. It then went through trials at the CEMA and was subjected to many of the modifications evaluated on the MB 151 and 152. Since the Twin Wasp was shown to be not superior to contemporary French radials, no production of the MB 153 was planned and the prototype was handed over to the Air Force on May 28, 1940, where it was listed as the MB 153 No. 434. It survived the Armistice and served in the Vichy Air Force.

The MB 154 prototype, built from airframe production number 435, was not completed since its engine was not delivered before the fall of France.

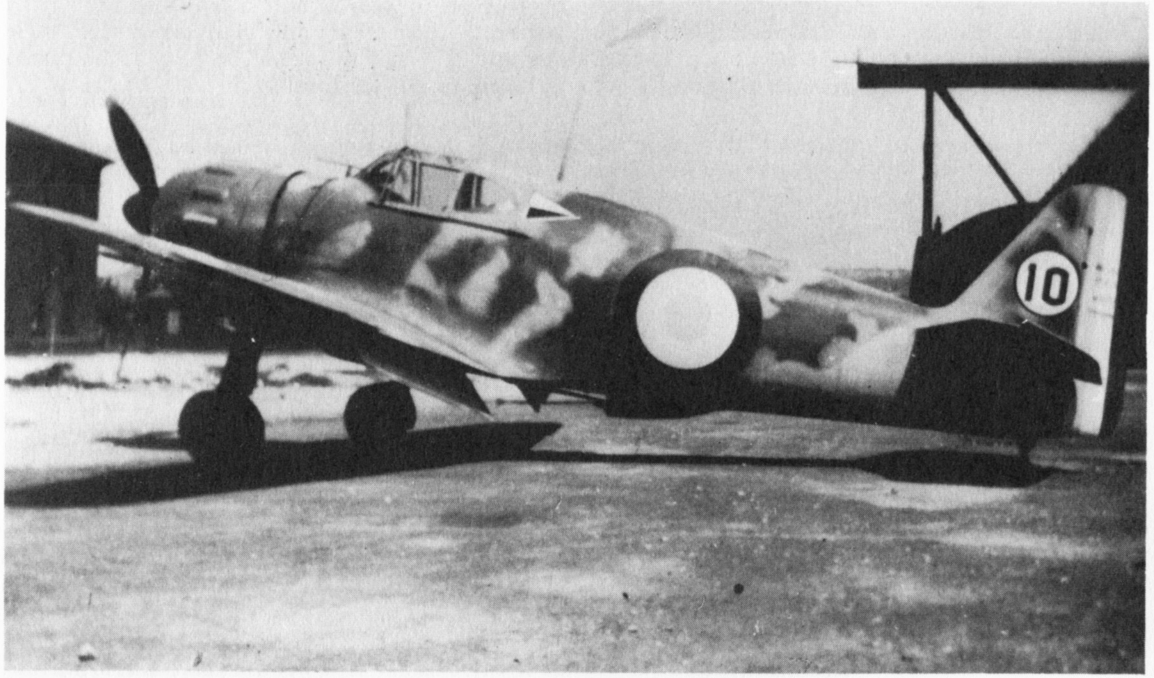
The MB 155, already mentioned, was developed in an effort to create a suitable warplane out of the MB 151/152, especially in view of their poor range and endurance. The MB 155 featured an enlarged fuselage fuel tank, a redesigned engine cowling without fairings for the individual cylinder heads, an armament of two HS 404 20-mm cannon and two belt-fed (instead of drum-fed, as on the MB 151 and 152) MAC 1934 M39 7·5-mm machine-guns, plus numerous detail refinements. The cockpit was further aft than on its predecessors, because of the bigger fuel tank and the necessary redesign of the forward fuselage.

It seems that the prototype, the MB 155-01, was constructed from airframe production number 449, one of those not completed as MB 152s because of shortage of undercarriages, and the first flight was made on December 3, 1939. Two days later it went to Villacoublay for accelerated tests and was returned to the manufacturer in mid-December for modifications to the engine cowling, the exhaust collector, the undercarriage and the tail surfaces. The first production aircraft, No. 701, was first flown on April 3, 1940 and deliveries were just getting underway at the time of the Armistice.

* * *

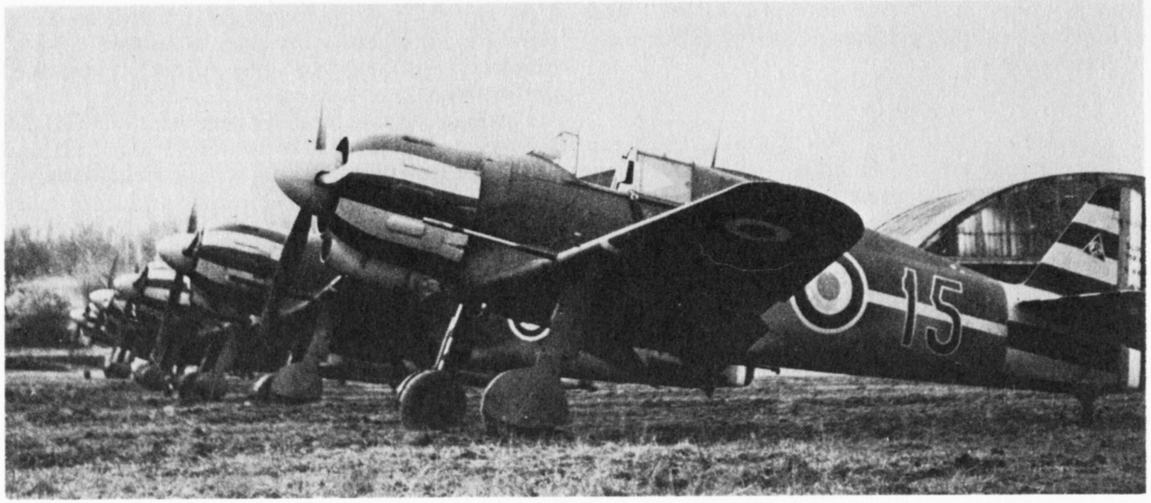
The chequered initial military career of the MB 151 and 152 has been mentioned earlier and, at the outbreak of the war, the French Air Force was possessed of a large number of these aircraft which were not only unsuited to combat but mostly lacking various items of important equipment, such as propellers, radios and armament. Plans to store the first 157 aircraft were abandoned in view of the need for advanced training aircraft. The MB 151s intended for the Air Force were issued to the Centres d'Instruction de Chasse at Chartres and Etampes in the Autumn of 1939, and to a number of Escadrilles Régionales de Chasse during the period October 1939–January 1940. It was intended that these units should be re-equipped with the MB 152, as sufficient numbers became available. Gradually, all MB 151s and 152s with the large-diameter cowlings were re-equipped with the definitive 30-inch diameter cowlings to give slightly improved performance.

During October and November 1939 GC I/1 was re-equipped with 26 modified MB 152s and initial experience with the type indicated that it was (literally) quite a handful and the pilots nick-named it the "avion à quatre mains" ("four-handed aircraft"). GC II/1 at Buc also received the MB 152 in November 1939 and the serious business of getting the type into combat service had begun. Groupes Aériens Régionaux de Chasse (GARC) I/561 and II/561 each received their first two MB 151s in November-December 1939 and were redesignated GC II/10 and III/10 respectively on January 11, 1940. Both units began re-equipping with the MB 152 in the ensuing weeks. On January 11, GC III/9 was formed from Groupe Aérien Régional de Chasse (GARC) 562. Each of these units still had some MB 151s on their strength when the invasion of the Low Countries and France began on May 10,



GC II/8 operated both the MB 152 and 155 in June 1940: the photograph shows MB 152 No. 177 with the 4th Escadrille
(Camouflage Air Club)

Sergent-Chef Motte of GC III/10, based at Le Havre-Octeville, seen in the cockpit of MB 152 No. 170 on 13 May 1940—the day before his death
(Archives Botquin)



MB 152s of GC I/1, 2nd Escadrille, serving in the Armistice Air Force in 1942, while based at Lyons-Bron (ECPA)

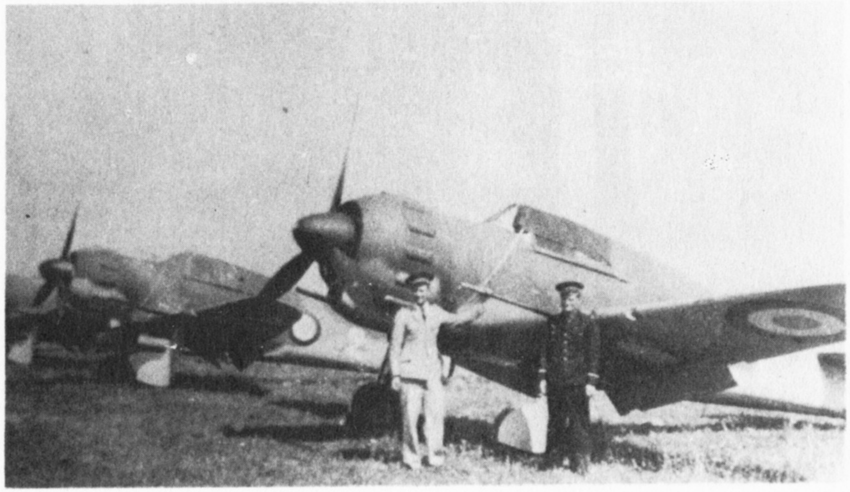
1940. GC I/8 began to convert from Dewoitine D510s to MB 152s at the end of December, and shortly afterwards GC II/8, a naval co-operation unit with Potez P 631s, followed suit.

A total of 140 MB 151s and 363 MB 152s had been taken on charge by the French Air Force by May 10, 1940, although some of the former had been passed on to the Aéronavale (16) and to Greece (7). Some 47 MB 151s were still with operational units but it was planned to withdraw them as soon as they could be replaced by MB 152s. Only 80 of the MB 152s were in the range from No. 501 onwards, so earlier aircraft were still in service with front-line units. Thus, on May 10, there were 93 serviceable and 53 reserve or unserviceable MB 152s with seven units. These were: GC I/1 at Chantilly-les-Aigles, and GC II/1 at Buc (both these for the defence of Paris); GC II/8 at Calais-Marck (to reinforce Aéronavale Escadrilles AC1 and AC2); GC II/10 at Rouen-Boos, and GC III/10 at Le Havre-Octeville (these for the defence of the Lower Seine area); GC I/8 at Velaine-en-Haye (in Eastern Air Command); and GC III/9 at Lyons-Bron (for the defence of the Lyons, Saint Etienne and Le Creusot).

There were other units which were training on the MB 151/152. The Polish-crewed unit, GC I/145, was at Lyons-Bron with some MB 151s preparing to convert to the MB 152 but, on May 12, it was decided to re-equip this unit with the Caudron C 714. The naval unit Escadrille AC3 was at Hyères training on MB 151s, and GC II/9, which had formed in North Africa in January 1940 on the MS 406 and arrived in France without aircraft, was selected to convert to the MB 152 at the time of the German invasion.

The initial stages of the German attack on the Low Countries hit the Bloch-equipped units hard. Attacks on the French Air Force bases and the inferiority of the MB 151/152 resulted in the units with these aircraft in the Northern Air Command (ZOAN—Zone d'Operations Aériennes Nord) losing more than half their strength within a week and, worse still, receiving practically no reinforcements. On May 15, GC I/8 was transferred to ZOAN and it is a measure of the battering that these units had taken that their strength of over 150 aircraft on May 10 had been reduced to 51 serviceable aircraft by May 17.

GC II/10 was at Rouen-Boos on 10 May 1940. At the time of the Armistice, when this photograph was taken, the unit had retreated to Toulouse-Blagnac (C-J. Ehrengardt)



Bloch MB 152s of GC I/6 in May 1940; the aircraft in the foreground, numbered 13, was that of the Groupe commander, Commandant Tricaud (Camouflage Air Club)

Top right: *Bloch fighters of GC II/8 lined up at Marignane in 1942. Aircraft '14' is an MB 155, the aircraft of the Groupe commander, while the others are MB 152s. The difference between the forward fuselages of the two types are evident* (ECPA)

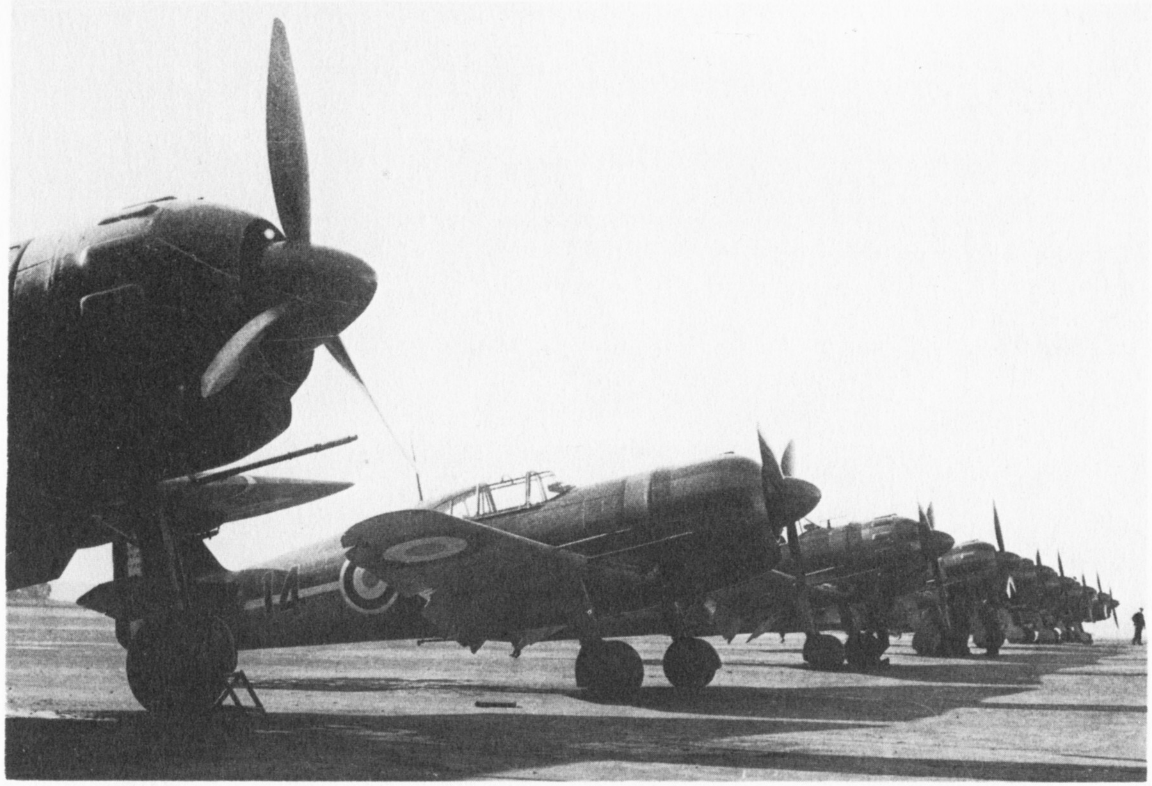
Bottom right: *MB 152 No. 696 while serving with GC III/9, based at Salon-de-Provence, in 1942* (C-J. Ehrengardt)

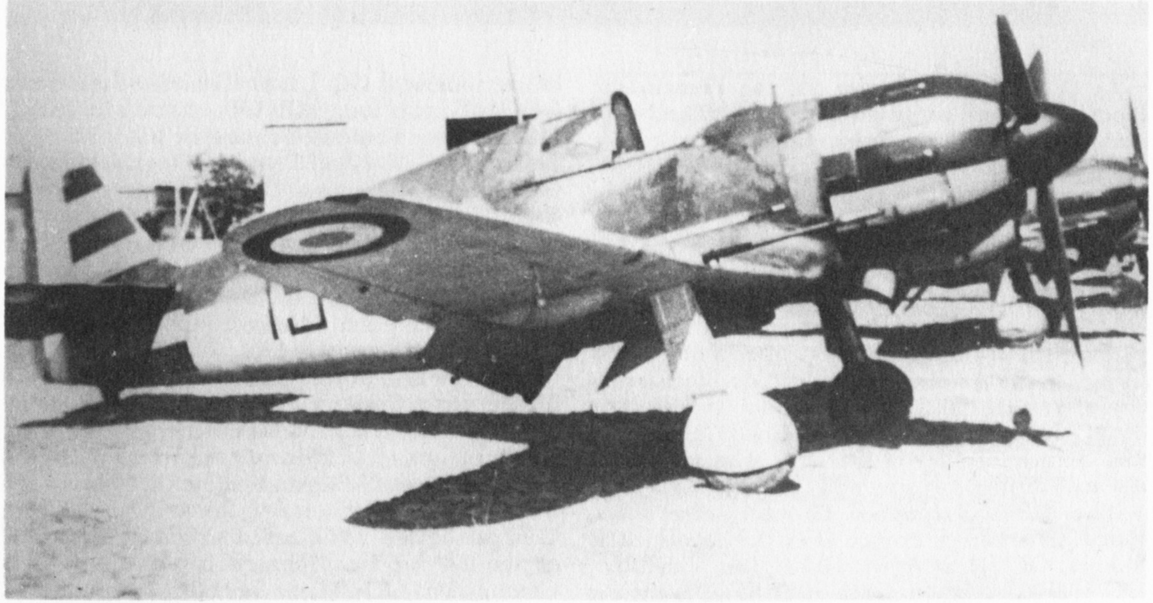
The confusion of the Air Force command echelons can be gauged from the fact that GC II/9 was ordered to convert from the MS 406, of which plenty were available, to the MB 152. One feels that the Blochs used for this purpose would have been better employed as reinforcements for the units already thus equipped. Over 100 Blochs had been lost in combat by the end of May, although 108 MB 152s had been issued to front-line units between May 10 and 31—mostly later in the month—to offset this grave loss.

The Escadrilles de Chasse de Défense, which came into existence for point defence duties, mostly with Polish pilots, made considerable use of the MB 151/152. Among those which used Blochs were: ECD 1/55 (at Tours); ECD 2/55 (Etampes); ECD 372 (Cazaux); and the unnumbered units at Angers, Bordeaux-Mérignac, Châteauroux and Romorantin. ECD 1/55 was eventually raised to the status of a Groupe de Chasse, as GC I/55, and officially credited with two confirmed victories and one probable.

After a disastrous episode with Caudron C 714s, the Polish-manned GC I/145 re-equipped with the MB 152 at half-strength, the remainder of its pilots being sent to reinforce GC I/1 and I/8. Within a few days, however, all Polish personnel were withdrawn from operations and evacuated to Britain.

The Aéronavale received a number of MB 151s, but was unable to engage in much fighting before the Armistice. Escadrille AC2 of Flottille F1C received six MB 151s late in May and a patrol was based at Maupertus-sur-mer. No victories were recorded, but one aircraft was lost while escorting the AB3 naval dive-bomber squadron. Escadrille AC3, at Hyères, received a number of MB 151s early in June and nine of these aircraft were involved in the fight against Italian aircraft on June 15; the same encounter in which Adjudant Pierre Le Gloan of GC III/6 did so well in his Dewoitine D 520 (see Chapter 3). AC3 lost two aircraft in this fighting and three were damaged, while the only victory gained was by a pilot who rammed a Fiat CR 42.





This photograph is of interest in that it shows one of the nine MB 151s delivered to Greece and used by that Air Force's 24th Squadron (Embassy of Greece, Berne)

As defeat loomed larger for the French, the Bloch units were withdrawn southwards and they were all in Southern France at the time of the Armistice. Four MB 151s were flown across the Mediterranean, with a refuelling stop on Corsica, and landed at Bône, but the rest of the Blochs remained in France because (except for the few MB 155s) they lacked the range to make the trip. The nine French Air Force Bloch units were credited with 146 confirmed and 34 probable victories from the time they entered full combat service to the Armistice. The leading Bloch pilots in the French "kill" list were Capitaine Delfino of GC II/9, Sous-Lieutenant Thollon of GC I/8 and Sergent Teillet of GC I/1, who all scored seven confirmed victories and one probable.

The MB 152-equipped Groupes were distributed in Southern France after the Armistice as follows: GC I/1 at Agen; GC II/1 at Valensole; GC II/6 at Avignon (with some D 520s among its equipment); GC I/8 at Toulouse-Francazal; GC II/8 (with four MB 155s) at Aix-les-Mille; GC II/9 at Toulouse-Francazal; GC III/9 at Le Luc; GC II/10 at Toulouse-Blagnac (including one MB 155); and GC III/10 at Toulouse-Francazal.

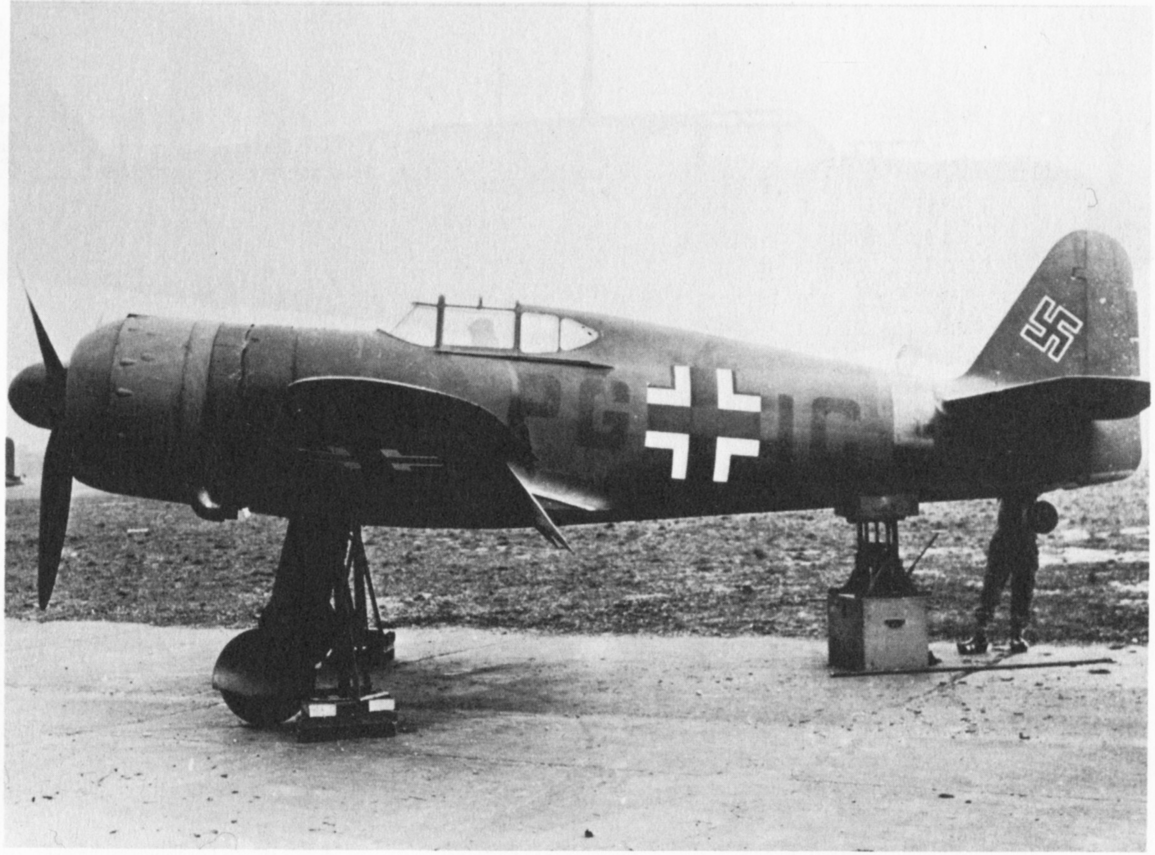
A total of 632 Bloch fighters was taken on charge by the French Air Force up to the Armistice, including 140 MB 151s (some passed on to the Navy and Greece); 482 MB 152s, one MB 153 and nine MB 155s. When a count was made at the end of July 1940, only 320 were left—51 MB 151s, 259 MB 152s, the MB 153 and the nine MB 155s. Over 250 were either lost to enemy action or abandoned during the retreat, while a few were flown to England before the Armistice.

The Vichy Air Force was allowed to retain six Groupes of MB 152 (including a few MB 155s) in the Free Zone of France by the Armistice Commission. GC II/1 at Le Luc, II/8 at Marignane and III/9 at Salon-de-Provence comprised Groupement de Chasse 22; GC I/8 at Montpeller-Fréjorgues was part of Groupement 23 (along with two Potez 631 units) and GC I/1 at Lyons and II/9 at Clermont-Ferrand were reserve units. GC II/6, II/10 and III/10 were disbanded in August 1940, as was Aéronavale Escadrille AC3, while AC2, which had moved to North Africa on June 25, 1940 was redesignated 2AC and re-equipped with the D 520 in September 1940.

As stated earlier, production of the MB 155 was just getting under way at the time of the Armistice. The first eight production MB 155s were flown from Châteauroux to Southern France before manufacture halted on June 18, 1940 and two airframes (Nos. 709–710) were destroyed by air attack. The Germans allowed 19 airframes, on which work was well advanced, to be completed after the Armistice and these (Nos. 711–729) were delivered to the Vichy Air Force. Some were stored, others were put into service with the 1st Escadrille of GC I/8 and one or two served with GC II/8.

The number of Blochs in service decreased rapidly and on November 1, 1941, the Vichy Air Force listed only 26 MB 151s (all in storage) and 196 MB 152s and 155s in its on-strength returns. During the Winter of 1941–2, about 95 MB 152s were fitted with a 70-litre (15·4 Imp. gallon) auxiliary fuel tank in the rear fuselage to permit them to fly the Mediterranean to North Africa non-stop, but this never happened. In addition, 20 of the stored MB 151s were modified to MB 152 standard.

The Bloch's day was almost over, for it had been decided in April 1941 to standardise all Vichy Air Force single-seat fighter units on the Dewoitine D 520 and the phasing-out process began in May 1942. The first unit to convert to the D 520 was GC I/1, and by July GC II/1 and III/9 had followed suit. The Allied invasion of North Africa the following November spelled the end of the Vichy Air Force, this being disbanded on November 27 and its aircraft seized by the Germans or scrapped. At the time of the dissolution, there were six MB 151s (20 had been converted to MB 152 standards) and 215 MB 152s and 155s on charge. GC I/8 had 27 Blochs at that time (including 10 MB 155s), II/8 had 26 and II/9 had 25. The Germans apparently supplied



The MB 157 was highly promising but did not fly until after the Armistice. The prototype is seen here at Bordeaux-Mérignac before its transfer to Orly (Dr Rivière)

a number of MB 152s to Romania, although their history there is obscure. Also the Luftwaffe acquired 173—including 83 serviceable aircraft from the last three units using Blochs—and some of these are known to have been used as advanced trainers.

No attempt seems to have been made to use Blochs recaptured during the invasion of France in June 1944 and presumably they were scrapped.

* * *

The Greek order for 25 MB 151s has been mentioned. In the event only nine were delivered, the remainder being embargoed by France in May 1940 and delivered to the Aéronavale. The nine aircraft delivered were put into service with the Greek Air Force's 24th Squadron, based at Thriassion, during the Summer of 1940. At some subsequent date, this unit was based at Salonika but nothing is known of how the MB 151s fared during the Italian invasion of Greece, which started on October 27, 1940, although only six are recorded as being serviceable at that time. Several of them were reportedly destroyed at Larissa by ground-strafing Bf 109s in April 1941, after the Germans came to the aid of the Italians in Greece. It is unlikely that any survived the air fighting there, which came to an end on April 27, 1941.

* * *

To round-off the story neatly, it is desirable to record the MB 156 and 157. The MB 156 was a project to re-engine the basic MB 152 airframe with the Gnôme-Rhône 14R radial; but it was abandoned in favour of a complete redesign to take full advantage of the more powerful 14R engine. The new project, designed by L. Servanty (who today is often, if somewhat poetically, described as the "Father of the Concorde") retained the general lines of its predecessors and was designated MB 157. It was powered by a Gnôme-Rhône 14R 4, rated at 1,590 hp for take-off (1,700 hp at 26,250 ft) and armed with two 20-mm cannon and four 7·5-mm machine-guns, all mounted in the wings.

Construction of the prototype began at Villacoublay in December 1939 and it was ready for assembly by the following June. By this time the invading Germans were approaching Paris and on June 9 the sub-assemblies were evacuated in the direction of Poitiers. They were captured en route by the Germans and sent to the SNCASO at Bordeaux-Mérignac, which was in the Occupied Zone. After the Armistice, the Germans allowed the prototype to be completed (without armament) and it was first flown in March 1942. The MB 157 proved to be an excellent performer, with a maximum speed of 441 mph at 25,750 ft and the ability to climb to 26,250 ft in 11 minutes. Early in 1943, the MB 157 prototype was ferried to Paris-Orly, but the Germans seem to have been less interested in the aircraft than in its engine. This was removed from the airframe and, after wind tunnel tests at Colombes, eventually taken to Germany. The airframe was stored at Orly and apparently destroyed in 1944 during an Allied bombing raid.

Bloch MB 151-155 Specifications

Type: Single-seat fighter; low-wing, all-metal monoplane with monocoque fuselage and retractable main undercarriage.

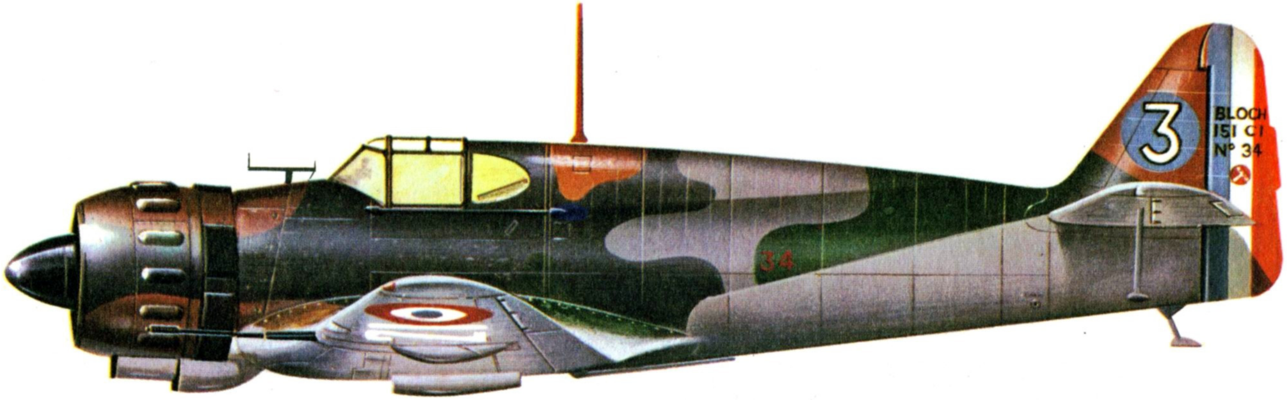
Powerplant: (MB 151) One Gnôme-Rhône 14N 35 14-cylinder air-cooled two-row radial with a maximum rating of 920 hp. (MB 152) One 1,100 hp Gnôme-Rhône 14N 25 or 14N 49 14-cylinder radial. (MB 155) One 1,100 hp Gnôme-Rhône 14N 49 radial.

Armament: (MB 151) Four 7.5-mm MAC 1934 machine-guns with 300 rounds per gun. (MB152) Two 20-mm HS 404 cannon with up to 60 rpg and two 7.5-mm MAC 1934 machine-guns with 500 rpg. (MB 155) Two 20-mm HS 404 cannon and two 7.5-mm MAC 1934 M39 machine-guns.

Dimensions: (All versions) Span, 34.57 ft; length, 29.86 ft; height (tail down), 9.94 ft; wing-area, 186.4 sq ft.

Weights: (MB 151) Empty, 4,570 lb; normal loaded, 5,560 lb; maximum take-off weight, 6,173 lb. (MB 152 with 14N 25 engine) Empty, 4,636 lb; normal loaded, 5,937 lb; maximum take-off, 6,173 lb. (MB 155) Empty, 4,718 lb; normal loaded, 6,283 lb; maximum take-off, 6,393 lb.

Performance: (MB 151) Climb to 13,123 ft, 7 min; range, 398 ml. (MB 152 with 14N 25 engine) Maximum speed, 299 mph at 18,045 ft; climb to 13,123 ft, 6 min 8 sec; range, 360 ml. (MB 155) Maximum speed, 323 mph at 14,764 ft; climb to 13,123 ft, approx. 7 min; range, 652 ml.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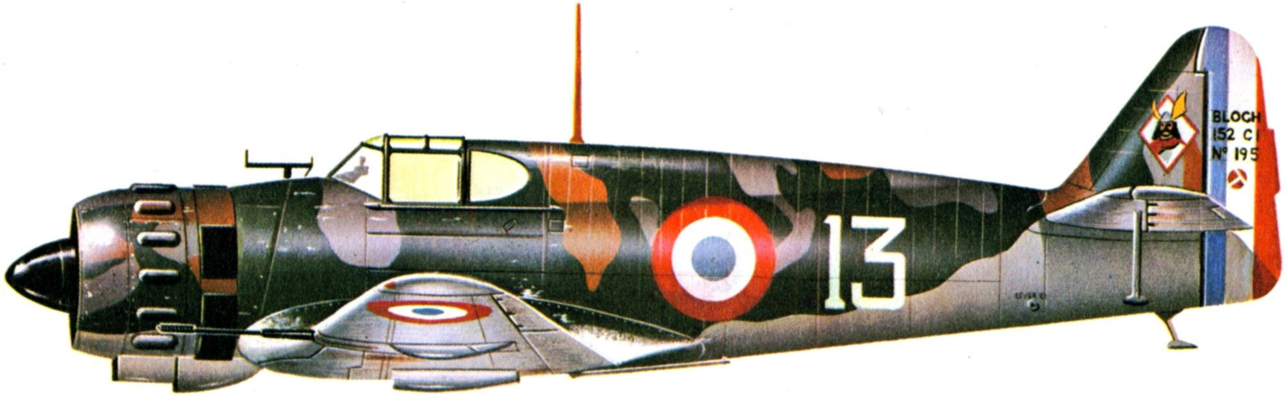
Bloch MB 151 No. 34 (matricule militaire Y-521) of Centre d'Instruction de Chasse (CIC) No. 6, Chartres, January 1940. A CIC was equivalent to an RAF Fighter OTU—Operational Training Unit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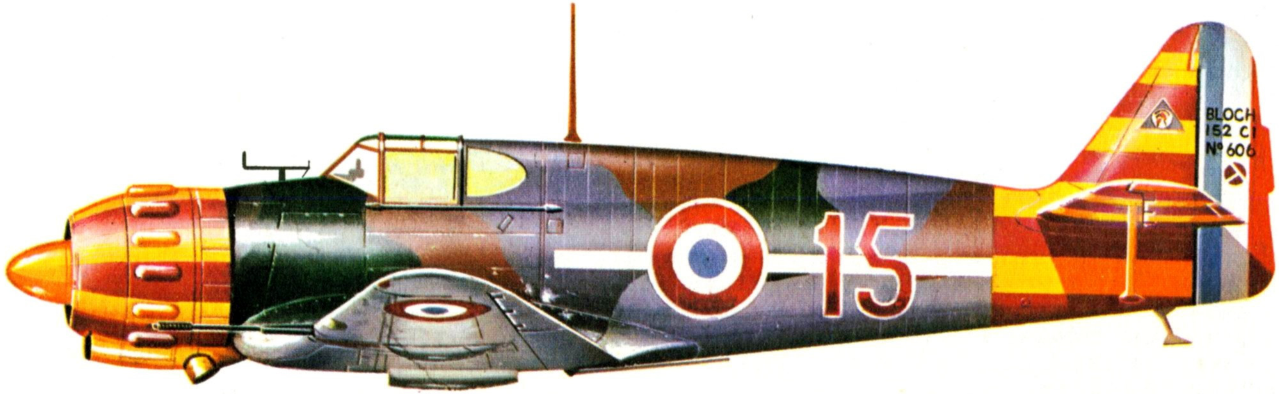
Bloch MB 152 No. 195, S.N.C.A. S.O.-built at Châteauroux-Déols and allocated to the 1st Escadrille, GC 1/6 in 1940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Bloch MB 152 No. 606 of 2nd Escadrille, GC I/1, Lyons-Bron, 1942

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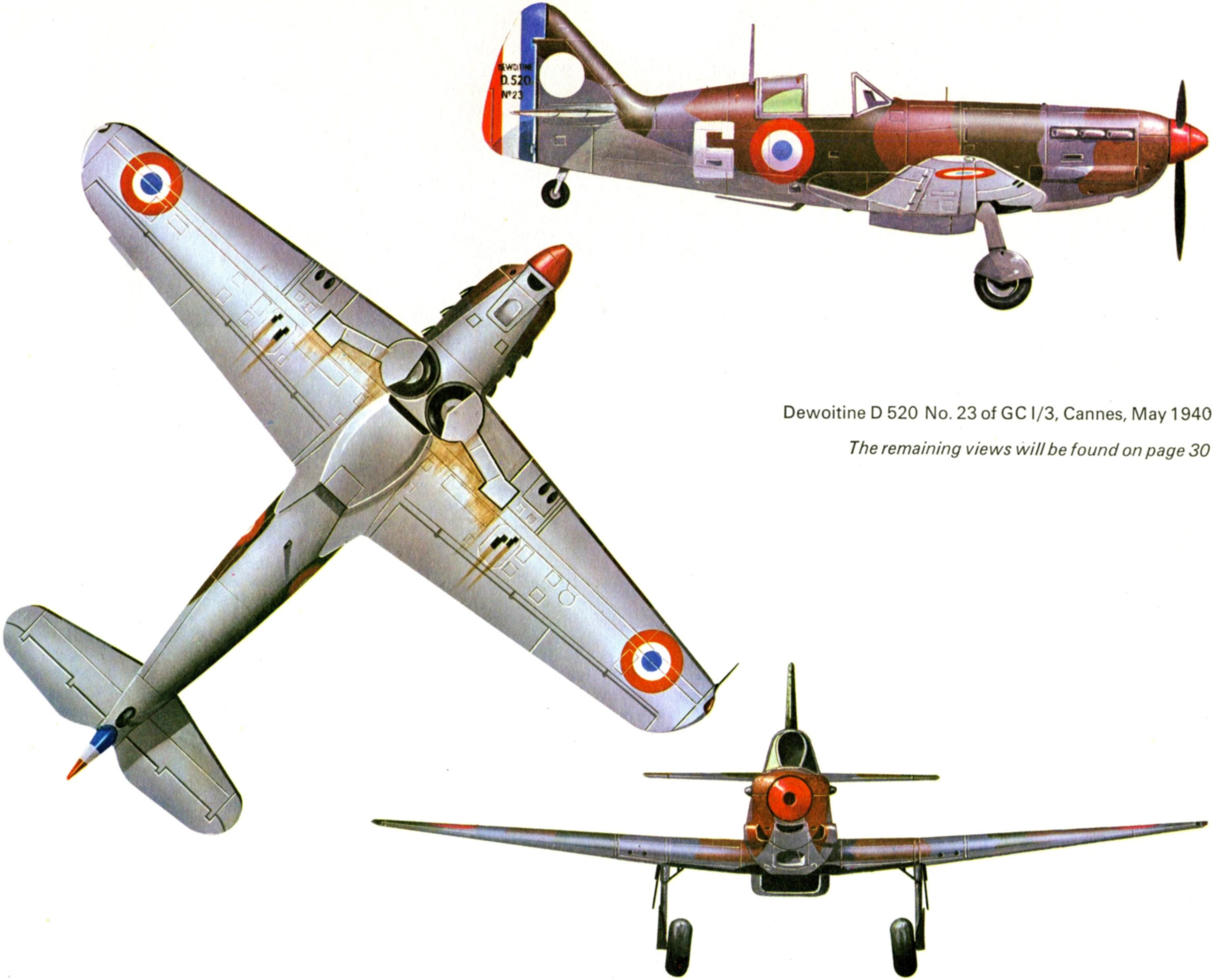
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Dewoitine D 520 No. 23 of GC I/3, Cannes, May 1940

The remaining views will be found on page 30

Dewoitine D 520

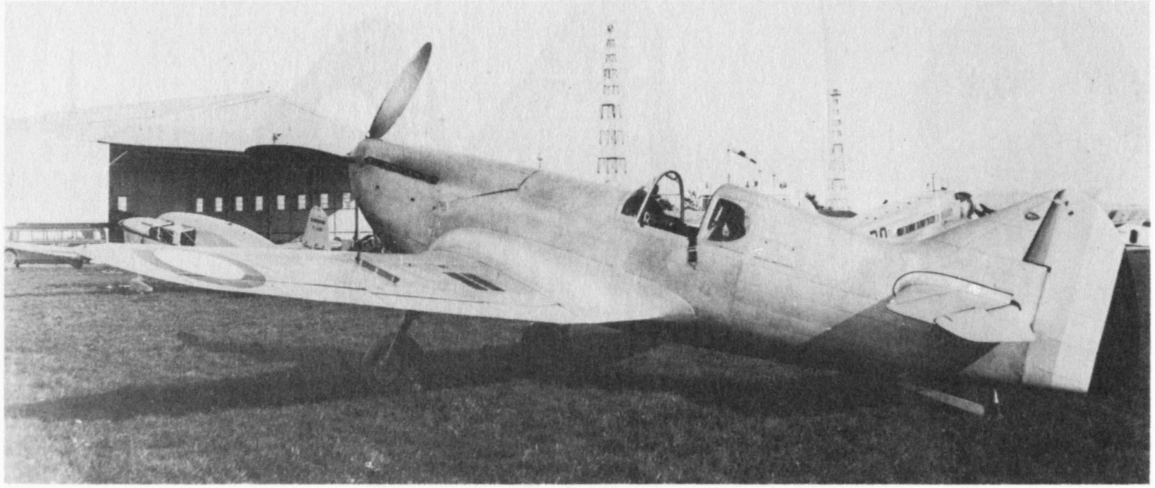
Without doubt, the Dewoitine D 520 was the best French fighter in quantity production in May and June 1940. It is generally considered that, but for the fall of France, its career would have rivalled those of the Supermarine Spitfire and the Messerschmitt Bf 109. Indicative of its inherent capability was the scope for improving the design still further, as evidenced by the several developments of the basic D 520 which were in the pipeline in 1940.

The Dewoitine company had already established itself as a prime source of fighters for the French Air Force during the inter-war years and the D 500, D 501 and D 510 made up the bulk of the first-line fighter strength during 1935–7.

Dewoitine entered the D 513 for the 1934 single-seat fighter competition—won by the Morane-Saulnier MS 405—and, although adjudged inferior to the winner, it was to provide the basis for a company private venture offered to the French Air Ministry in the Summer of 1936. The private venture was to have been powered by a 900 hp Hispano-Suiza 12Y 21 inline and to have an estimated maximum speed of 310 mph. This was rejected by the Air Ministry, which was then toying with a new single-seat fighter Specification calling for a maximum speed of 323 mph.

This Specification was never officially issued, but the Industry was informed of official thinking and Dewoitine reworked the private venture design to conform with the unissued requirement, presenting it to the Air Ministry in January 1937 as the D 520. An official Specification, STAé A23, was issued in the same month but the Air Ministry informed Dewoitine that an order would not be placed because, although the D 520 met the standard set, the MS 406 was about to be ordered into production.

The Dewoitine company was incorporated into the Société Nationale de Constructions Aéronautiques du Midi (SNCAM), at this time, and Emile Dewoitine was appointed Deputy Managing Director of the new organisation. Mindful of the fact that Morane-Saulnier's initiative had resulted in its winning the 1934 fighter competition, Dewoitine continued development of the D 520 at the SNCAM as a private venture. Plans were made to produce two prototypes and a non-flying structural test airframe and construction work began at Toulouse in December 1937. This enterprise was rewarded in April 1938, when Contract 513/8 was awarded to the SNCAM for two prototypes (No. 02 and No. 03; the first prototype, No. 01, not being included). The Air Ministry's STAé officials examined the mock-up of the D 520 in July 1938 and recommended a number of minor changes which delayed slightly the completion of the first prototype.

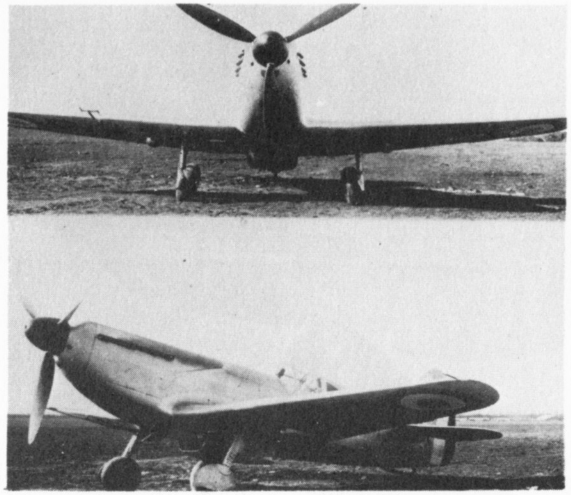


The Dewoitine D 520-01 at the time of its second flight; the first flight was carried out with a two-blade fixed pitch airscrew. The cockpit canopy has not been fitted and the underwing radiator outlet can be seen on the port wing upper surface (via the author)

This prototype, the D 520-01, was completed during September 1938 and showed itself to be a modern conception, although not looking "quite right". Powered by a 890 hp Hispano-Suiza 12Y 21 inline, the D 520-01 was unusual in having leading-edge wing slats; although, they were never tested and were omitted from subsequent aircraft. Flight testing began on October 2, 1938, in the hands of Michel Doret. Initially, the first prototype had a provisional two-blade propeller and was flown without the sideways-opening cockpit canopy. The first tests were not auspicious. The drag of the underwing coolant radiators and the inefficient propeller kept the maximum speed down to about 300 mph, and lateral stability was insufficient. Following a wheels-up landing in November 1938, the opportunity was taken to re-engine the D 520-01 with a Hispano-Suiza 12Y 29 motor. Also, the underwing radiators were replaced by a single central radiator under the fuselage and the area of the tail surfaces was increased. The aircraft then proved capable of attaining the required 323 mph.

The D 520-02 second prototype made its first flight on January 28, 1939 and differed from the D 520-01 by having a completely redesigned tail unit, a rearwards-sliding cockpit canopy, an improved undercarriage with new shock absorbers and a provisional armament of one 20-mm cannon firing through the propeller hub and two 7·5-mm machine-guns mounted in fairings under the wings. The D 520-02 initially bore the inaccurate marking "D 520 No. 1" (to persuade foreign observers that production had already begun) and the matricule militaire F-317. Soon after the first flight, the D 520-02 was sent to the CEMA, Villacoublay, for official flight trials and recorded a maximum speed of 326 mph at 16,400 ft, and climbed to 26,240 ft in 12 minutes 55 seconds. In Summer 1939, it was re-engined with a Hispano-Suiza 12Y 31 motor, which boosted maximum speed to 341 mph at 17,060 ft.

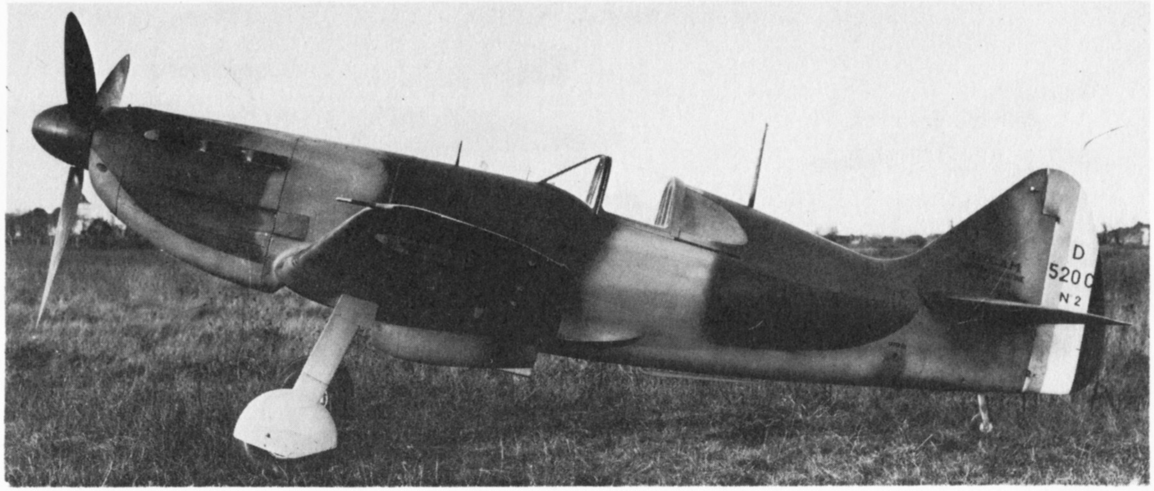
The third prototype, D 520-03, was generally similar to the D 520-02, except for the fitting of an improved supercharger and the replacement of the tailskid by a steerable, non-retractable tailwheel. It was flown for the first time on March 15, 1939. Shortly afterwards, it was evaluated by a Belgian pilot, Captain Arendt, in view of that country's interest in the type—which came to nought. Later, the D 520-03 was used for armament trials with the planned production



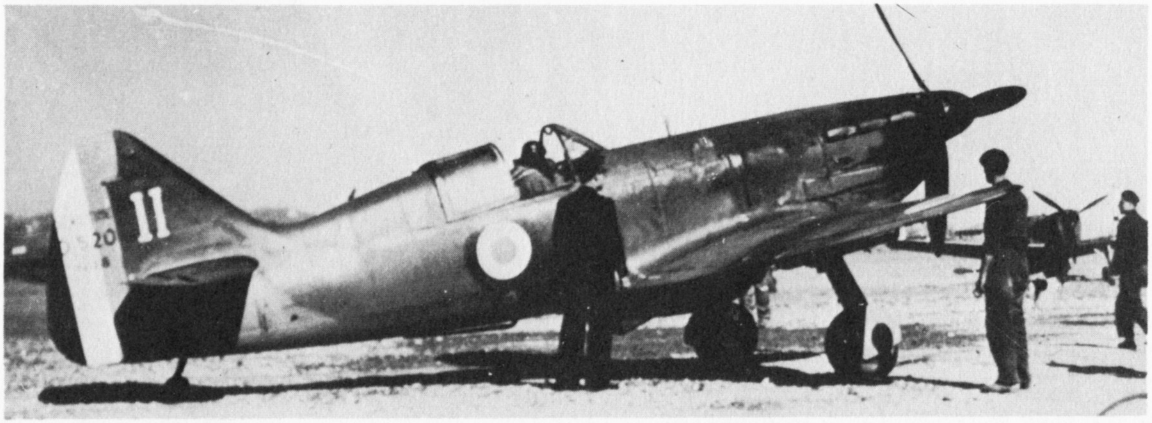
Above: *The D 520-02 initially carried the false marking 'D 520 No. 1' in an attempt to make the Germans believe the type was in production. The correct tail marking was applied in March 1939* (ECPA)

Right: *Production of the D 520 was underway by the end of 1939 and this view shows aircraft lined up at Toulouse awaiting check-flights in the Spring of 1940* (ECPA)

Right-Bottom: *D 520 No. 48 was delivered to GC I/3 at Cannes-Mandelieu in April 1940 for combat training* (ECPA)



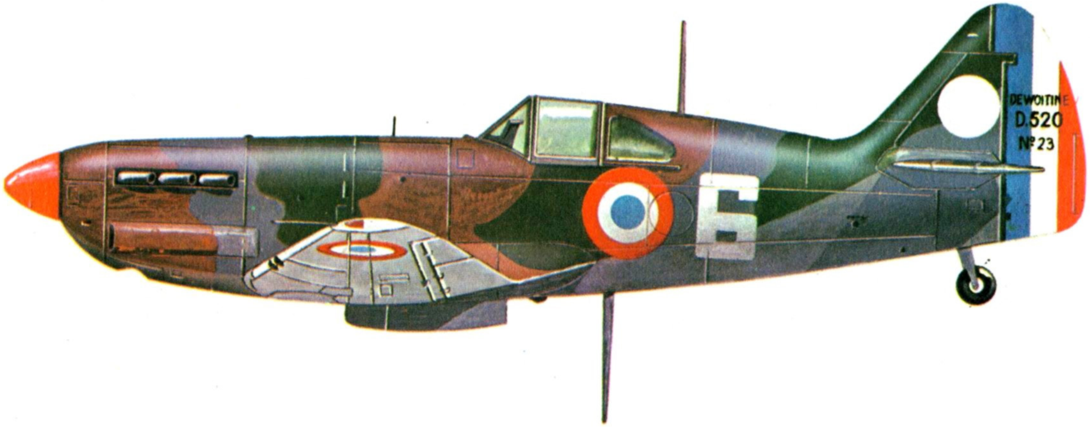
Above: *This illustration shows details of D 520 No. 2, the second production aircraft* (Sud-Aviation)



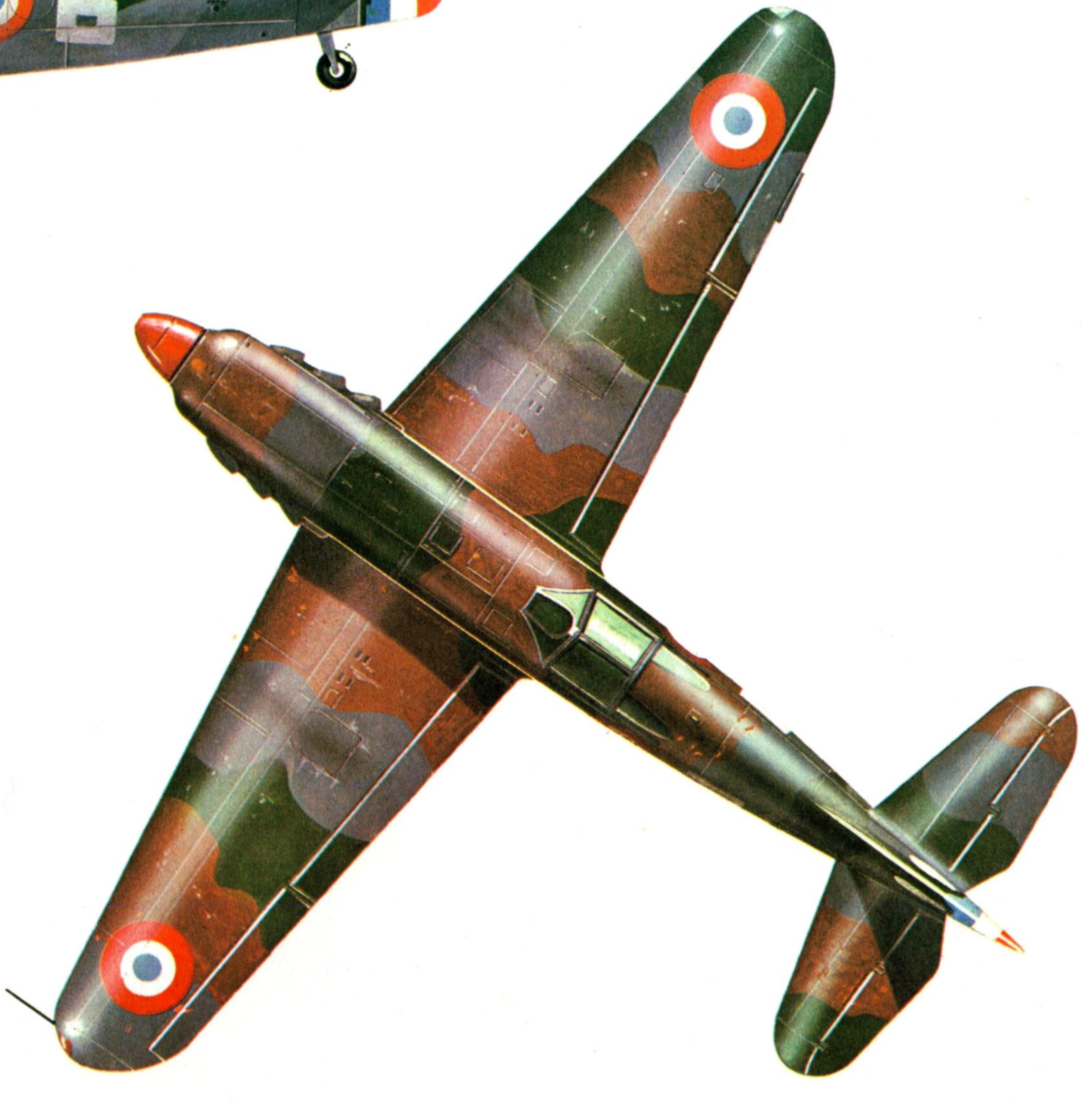
armament of one engine-mounted 20-mm HS-404 cannon and four wing-mounted 7·5-mm MAC 1934 M39 machine-guns.

Even if the French fighter forces had not been far below their planned strength in April 1939, an excellent case could have been made for ordering the D 520 because all French fighters then in service, or on order, were decidedly inferior to the Messerschmitt Bf 109E. A measure of the dire straits of the Air Ministry was the fact that Contract 588/9 of April 1939 called for 200 D 520s to be delivered to the Air Force between September and December 1939. This was an impossible target and the first D 520s of this initial order for the type were not delivered until December 1939.

The production D 520 had a fuselage lengthened by 20 inches—compared with the prototypes—and was powered by a Hispano-Suiza 12Y 45 driving a Ratier propeller and rated at 930 hp for take-off. The engine cowlings were modified, two additional fuel tanks were installed in the wing leading-edges, and armour plate was fitted behind the pilot's seat. The design, in its production form, thus assumed the graceful lines evident



DEWOITINE
D.520
Nº23
6



Dewoitine D 520 No. 23 of GC I/3, Cannes, May 1940

The remaining views will be found on page 27

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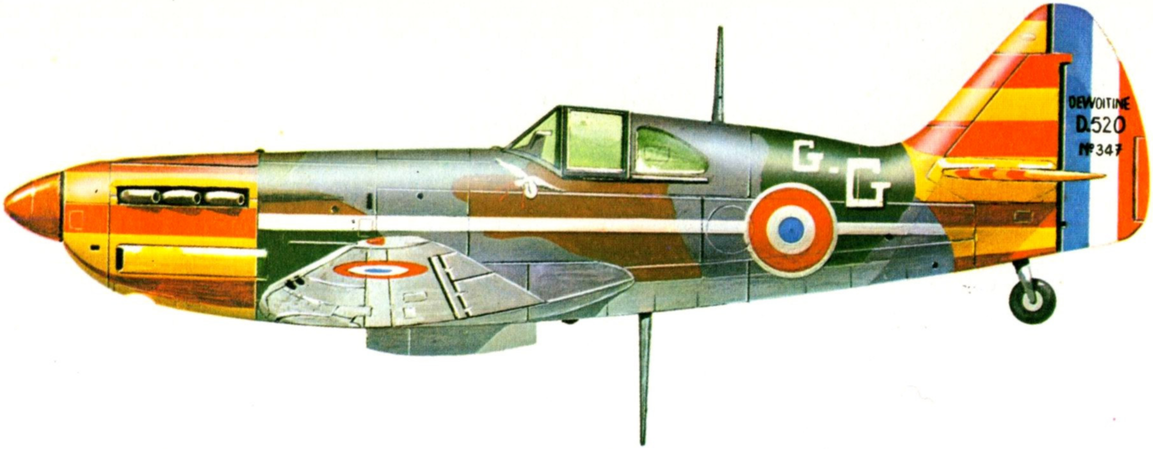
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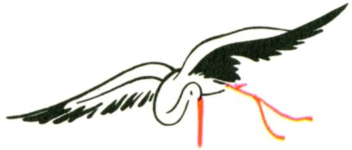
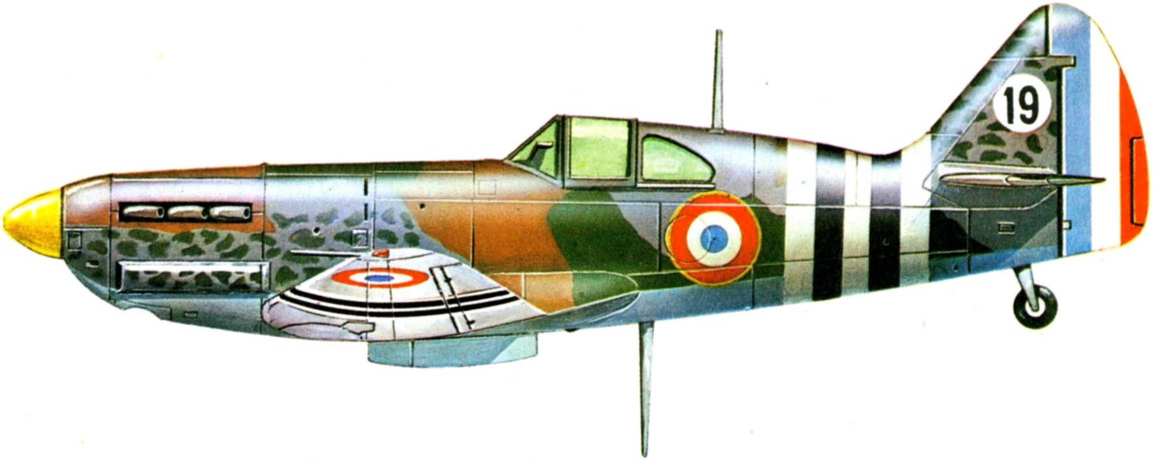
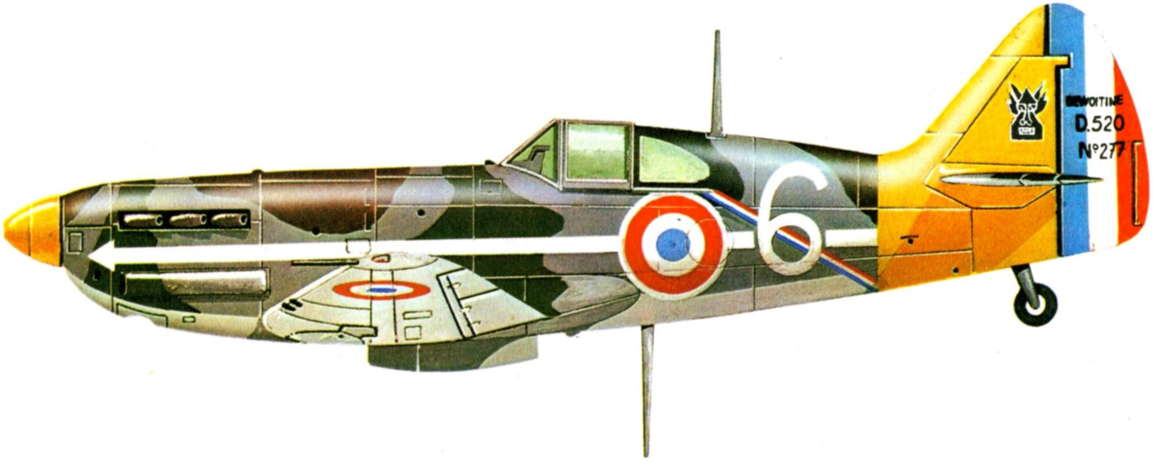


D 520 No. 347, of 3rd Escadrille, GC II/7, Bizerta (Tunisia), early 1942

D 520 (No. unknown) of GC II/18, Southwest France, late 1944

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DEWOITINE
D.520
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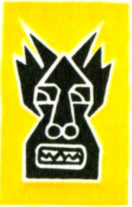


D 520 No. 277 of 5th Escadrille, GC III/6, Rayak (Syria), June 1941, flown by Sous/Lt. Pierre Le Gloan

D. Johnson © Hylton Lacy Publishers Ltd

from photographs. The first 30 production aircraft were allotted matricules militaires from F-187 onwards, but the practice was dying out by this time and no other D 520s actually carried them.

A second order for the D 520, Contract 912/9, was placed in June 1939 for a further 600 aircraft (reduced to 510 in the following month) and Contract 1948/9, placed during the first days of the war, brought the total on order to 1,280.

Engine development problems delayed the completion of the first production aircraft until the end of October 1939, and it did not fly until November 2. Revised production schedules, as a result of these engine problems, had called for 44 D 520s to be completed by the end of 1939 but only 19 were actually produced. Furthermore, the initial aircraft were dogged by minor troubles such as engine overheating at maximum rpm, inefficient supercharger intakes, and problems with the armament system.

Four D 520s were handed back to the SNCAM in March 1940, to hasten the cure to these problems, and early the following month the first "bon de guerre" (operationally suitable) aircraft became available. Official performance tests at this time, on D 520 No. 2, recorded a maximum speed of 332 mph at 18,040 ft.

Preparations for the D 520's entry into service had been going on since mid-January 1940 and GC I/3 was chosen to be the first operational unit. By early May, GC I/3 had completed conversion to the compact D 520 and it proved to be very popular with its pilots.

Further development of the design had been progressing while flight testing and production of the D 520 were proceeding. The first proposal was the fitting of the Rolls-Royce Merlin III inline to the airframe but this had to be abandoned shortly after design work began in November 1939 because all Merlins being supplied to France were needed for the Amiot 353/356 two-motor bombers. However, D 520 No. 41 was fitted with a Merlin engine and first flew thus equipped on February 9, 1940 under the designation D 521-01. Seven flights were made with the Merlin and the D 521's performance was noted to be superior to that of the standard D 520. The last test flight with the Merlin was carried out on March 23, 1940 and this aircraft subsequently became the D 524.

The proposed D 522 was to be powered by the 1,040 hp Allison V-1710-C15 inline engine. It did not materialise, however, because negotiations for it to be mass-produced in the USA—by the Ford Motor Company—were interrupted by the Armistice.

An aircraft of GC II/3, D 520 No. 38, in June 1940
(Dr Rivière)

The original Specification had called for the design to be capable of taking the 1,000 hp Hispano-Suiza 12Y 51 engine and this version was designated D 523. Thus, airframe D 520 No. 45 was fitted with this engine (with the production number D 523 No. 45) and tested during May and June 1940. Unfortunately, performance figures have not survived. The aircraft was converted back to D 520 configuration after the Armistice, but it was planned that aircraft Nos. 601–780 on the production line were to be D 523s. The Armistice thwarted this scheme.

The airframe D 520 No. 41 used to test the Merlin engine was converted yet again in June 1940 to take the 1,200 hp Hispano-Suiza 12Z under the designation D 524. Before flight trials could begin, the Armistice intervened and the test-bed was converted back to standard D 520 configuration without having been flown in D 524 form. This H12Z-powered version had an estimated maximum speed of 382 mph and it was proposed to introduce it onto the production line from aircraft No. 781 onwards.

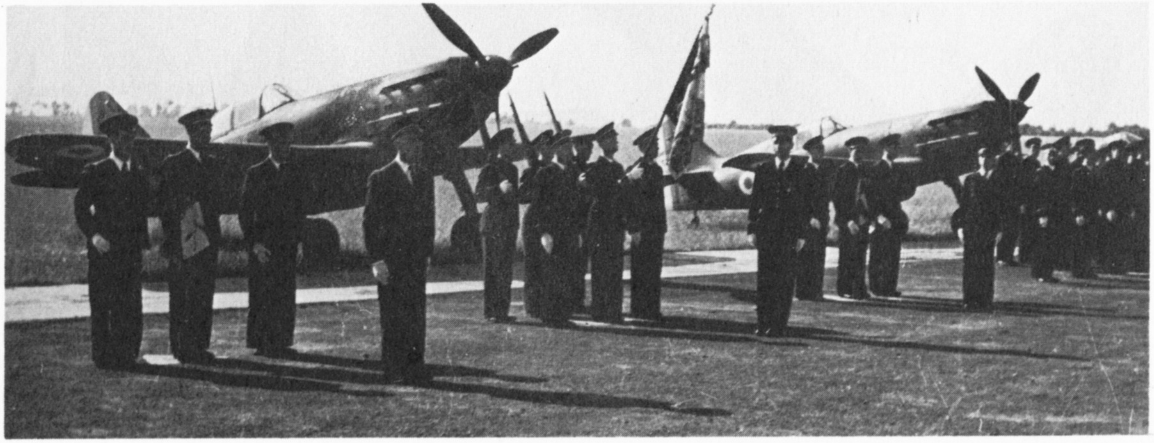
Other derivatives of the design are described later in the chapter: the D 520Z was not developed until after the Armistice, while the D 551 and 560 warrant separate treatment.

* * *

Groupe de Chasse I/3 received its first D 520s, for training, in January 1940 and the first combat-worthy aircraft of the type arrived at its Cannes-Mandelieu base on April 17. It was the only D 520-equipped unit operational on the type when the Germans invaded France and the Low Countries on May 10, 1940. By this date, the SNCAM had completed 246 D 520s and 79 had been taken on charge by the French Air Force. Production was approaching full swing at this time, at a rate of 100 per month, and was to reach 10 per working day during June. GC I/3 first went into action on May 13 in the area of the Belgian frontier, shooting down three Henschel Hs 126s and one Heinkel He 111 without loss to themselves.

GC II/3 began training on D 520s before the German offensive but did not become operational until May 20, then being thrown into combat immediately. GC III/3 was next to

GC I/2 on parade after the Armistice, with the unit's D 520s in the background
(ECPA)



follow in the re-equipment plan, but GC II/7 was so badly hit in the early days of the German onslaught that it was moved immediately ahead of GC III/3. GC II/7 was in action with its D 520s on June 1 in the Marseilles; and just four days later, GC III/3 was also in action with the Dewoitine. Only one further unit saw action with the type before the Armistice, this being GC III/6 which, like all the other D 520 units, had formerly been equipped with the MS 406. After its first combat on June 13 against Italian raiders over Southern France, this unit was the source of a notable individual feat two days later. Adjudant Pierre Le Gloan scored five victories on June 15 (four Fiat CR 42 and one Fiat BR 20), two of them in collaboration with Capitaine Assolant—these all being confirmed by the later discovery of the wrecks of the "downed" aircraft. This point is stressed because the official Regia Aeronautica history records the loss of only one BR 20 and three CR 42s that day, two of the latter apparently fighting against Bloch 151s of the Aéronavale.

The French Navy's 1st Flottille de Chasse, comprising Escadrilles AC1 and AC2, took delivery of 26 D 520s between June 9–22, 1940, but did not see combat with them, while AC3 and AC4 received a similar number just before the Armistice. Some of these were flown to North Africa before the fighting stopped and all the previously mentioned Air Force units equipped with the D 520 were also withdrawn there. The Air Force units GC II/6 (equipped with MB 152s) and III/7 (MS 406) were in the process of converting to the Dewoitine fighter at the time of the Armistice; they remained in France and were disbanded during the Summer of 1940 with the aircraft being put into storage.

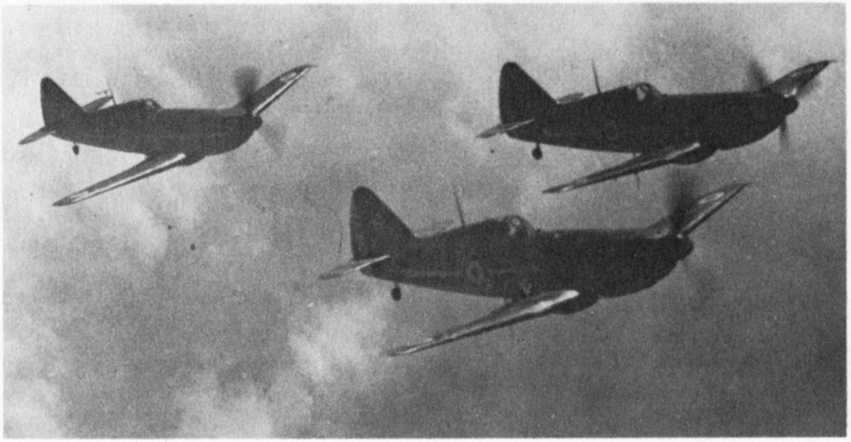
The number of D 520s on order at the outbreak of the war was 1,280, as noted earlier. By May 1940, this total had risen to 2,200 (including orders for the D 523 and D 524 derivatives) for the Air Force and 120 for the Navy; all to be delivered by the end of 1940. When the guns stopped firing and the factories came to a standstill on June 25, 1940, some 438 D 520s had been completed and 403 taken on charge—359 by the French Air Force and 44 by the Aéronavale. Pilots flying the type were credited with 108 confirmed and 39 probable victories. About 100 D 520s were lost in battle or otherwise written-off during the German invasion. A census after the fighting was over showed that 153 remained in France and 175 were in North Africa. Three were flown to Britain.

The Armistice Air Force, as originally created, included four D 520-equipped squadrons (GC I/3, II/3, III/6 and II/7), all based in North Africa. The aircraft of this type left in France were put into storage. In addition to the Air Force units, Aéronavale Escadrille AC1 was equipped with the D 520 early in June and was joined by Escadrille 2AC in September 1940.

These units resumed training after the defeat of June 1940 and set about rebuilding their shattered morale. The following year, during the fighting in Syria in June–July 1941, three D 520 units—GC II/3, III/6 and 1AC—were sent to reinforce the MS 406-equipped unit, GC I/7. GC II/3 was credited with three confirmed and two probable "kills" during the Syrian campaign, while GC III/6 had 19 confirmed and four probable victories, and the Aéronavale Escadrille 1AC scored eight confirmed.

The German Armistice Commission agreed to a re-equipment programme for the Armistice Air Force in April 1941 and this envisaged the manufacture of a further 550 D 520s by the Société Nationale de Constructions Aéronautiques du Sud-Est (SNCASE) at Toulouse. (The SNCASE took over the SNCAM's Toulouse plants when the latter was dissolved early in 1941.) It was intended that the D 520 should become the Armistice Air Force's standard single-seat fighter, replacing all other types remaining in service and equipping new units from September 1942 onwards. By July 1, 1943 there were to be 17 Groupes de Chasse, equipped with 442 D 520s and the Aéronavale was to have three D 520 Escadrilles, totalling 36 aircraft.

The SNCASE received Contract 157/41 for the 550 D 520s in August 1941, and since the company had started preparatory work earlier in anticipation, the first 22 were delivered that month. A total of 349 was delivered by the end of 1942, when work stopped following the "invasion" of the Free Zone of France by the Germans. Of these, 197 were powered by Hispano-Suiza 12Y 49 engines rated at 900 hp for take-off and driving Chauvière propellers. Performance of the D 520 with this engine was similar to that



A 'patrouille simple' of D 520s of GC II/3 in Tunisia, 1941 (Camouflage Air Club)

Right: *A D 520 of GC II/3 at Casablanca in 1942, supposedly the aircraft of Lieutenant Bouhy who lost his life on 8 November 1942 while attempting to take off in the early stages of 'Operation Torch'* (C-J. Ehrengardt)

Right: *D 520 No. 248 of GC II/7, 4th Escadrille, seen flying over Tunisia in late 1940 or early 1941* (ECPA)

with the 12Y 45 engine, although it was slightly improved at altitude.

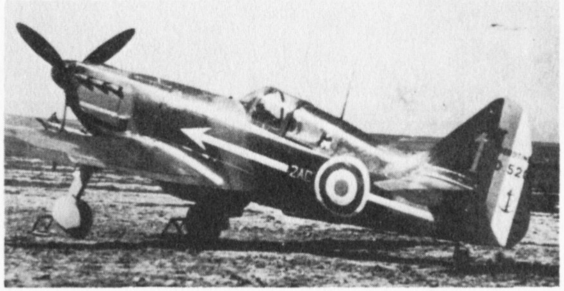
In addition to the resumption of production, development of the Dewoitine D 520 continued after the Armistice of June 1940. The SNCASE produced prototypes of two new versions. The first, known as the D 520Z, was actually aircraft No. 465, powered by a 12Y 49 engine, embodying detail improvements such as a heat exchanger oil cooler, modified engine coolant radiator, individual "ejector" exhaust pipes and an improved undercarriage. The D 520Z first flew at the end of 1941 and its high-altitude performance included a maximum speed of 348 mph at 23,03ft. It was intended as a flying test-bed for the confusingly-designated SE 520Z, which was a higher-powered and refined variant of the D 520 design.

The Armistice Air Force studied the SE 520Z proposal and in September 1942 the German Armistice Commission authorised the production of 105 aircraft of this type. Construction of the prototype began that month and, surprisingly, the Germans did not stop work when the Free Zone was occupied in November 1942. The prototype SE 520Z was completed in February 1943 and was distinguished from the standard D 520 by the longer nose which increased overall length by 14 inches. A 1,200 hp Hispano-Suiza 12Z 01 engine was installed, although it was planned to fit production examples with the 1,600 hp version of the 12Z engine. Weighing 7,011 lb loaded, the production SE 520Z had an estimated top speed of 409 mph at 30,010 ft. It never flew during the war—the Germans forbad flight tests and after a period of limbo in some Toulouse hanger it was decided, in 1947, to use the prototype as a test-bed for the Hispano-Suiza 12Z. The SE 520Z was given the civil (experimental) registration F-WEPJ for these trials but work proceeded so slowly it was October 1948 before the first taxi-ing trials were made. Interest in the programme was waning by this time and the SE 520Z seems not to have flown before the programme was abandoned early in 1949.

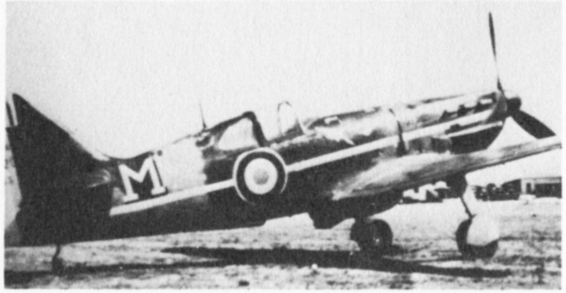
The D 520's service history so far related was left at the time of the Syrian fighting. The original four North Africa-based units, GC I/3, II/3, III/6 and II/7 were supplemented by a further six D 520-equipped units of the Armistice Air Force before the Allied invasion of North Africa in November 1942. (It should be noted that GC I/3 had been redesignated III/3 at the end of 1941 after three pilots had defected with their aircraft to join the Allies in Gibraltar.) The newly-equipped units were: GC I/1, II/1, I/2 and III/9 in the Free Zone of France; GC II/6 in Senegal; and GC II/5 in North Africa, which was partly equipped with the D 520. Aéronavale Flottille 1F, comprising Escadrilles 1AC and 2AC, was in North Africa flying D 520s. On November 1, 1942, there were 173 D 520s in North Africa and a further 30 in Senegal. In the Free Zone of France figures are only available for November 15, 1942, when 234 were counted including 89 in storage, although it should be noted that GC I/2 escaped to North Africa and freedom on November 9 with 24 aircraft.

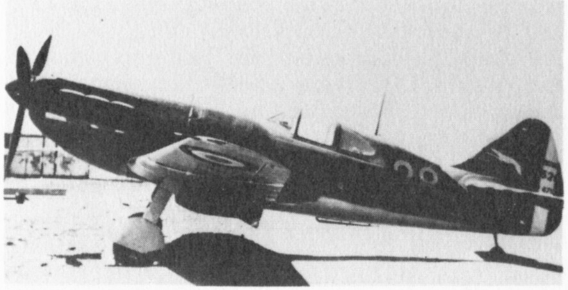
For the Armistice Air Force, "Operation Torch", the Allied invasion of North Africa, was a difficult episode; although some units fought savagely against the invaders. For example, D 520s of GC III/3 and II/5 and Escadrilles 1AC and 2AC were in action from first light on November 8 and during the following two days, the Armistice Air Force lost 16 D 520 and Hawk 75 fighters and the Aéronavale lost 19 Dewoitines. The Allies lost 25 fighters and 19 other aircraft in action before the fighting ceased on November 10.

Aéronavale Escadrille 2AC operated the D 520 in North Africa after the Armistice (C-J. Ehrengardt)

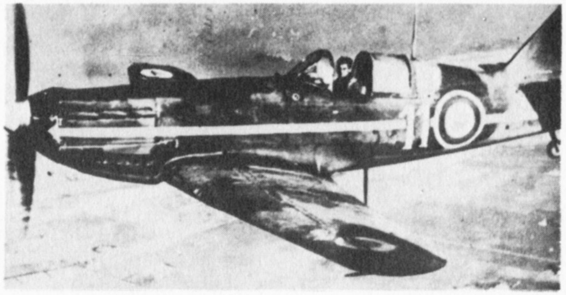


D 520 No. 245 serving with GC II/7, 3rd Escadrille, at Gabes in 1942 (C-J. Ehrengardt)

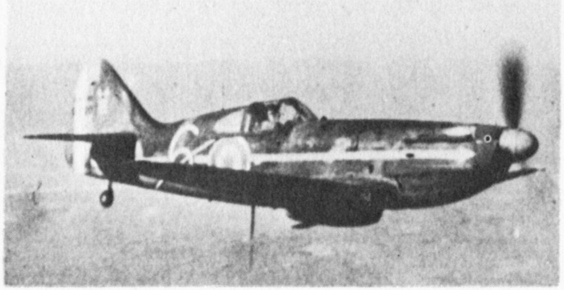




This D 520, No. 471 serving with GC II/3, 4th Escadrille, at Algiers-Maison Blanche in the Summer of 1942, shows the Tricolour wing band carried by Armistice Air Force aircraft in 1941-42
(Camouflage Air Club)

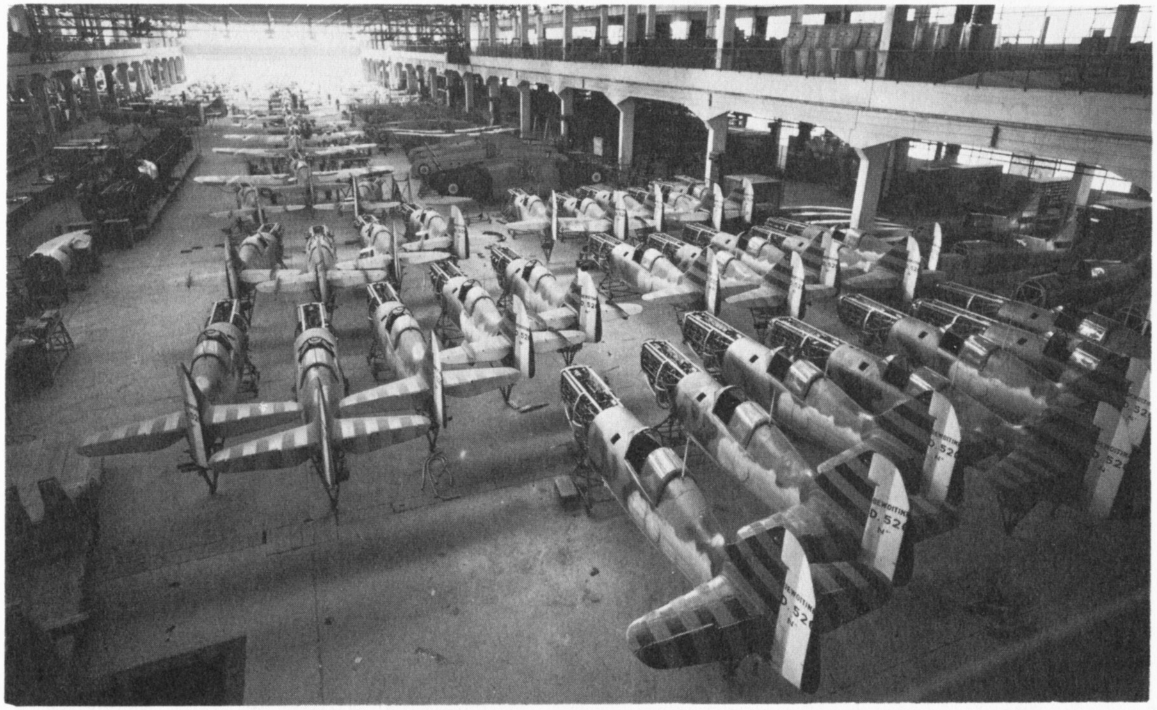


An aircraft of GC III/6, 5th Escadrille, flown by Sergent Hardouin. At this time—late 1940—the unit was based in Casablanca
(C-J. Ehrengardt)



D 520 No. 277 serving with GC III/6, 5th Escadrille, based at Algiers-Maison Blanche in May 1941 and flown by the 'ace' Adjudant-Chef Pierre Le Gloan. He always numbered his aircraft 6
(ECPA)

Right: *Production of the D 520 was resumed after the Armistice, when the type was selected as the standard Armistice Air Force single-seat fighter. Here is the production line at Toulouse on 7 October 1942* (Sud-Aviation)

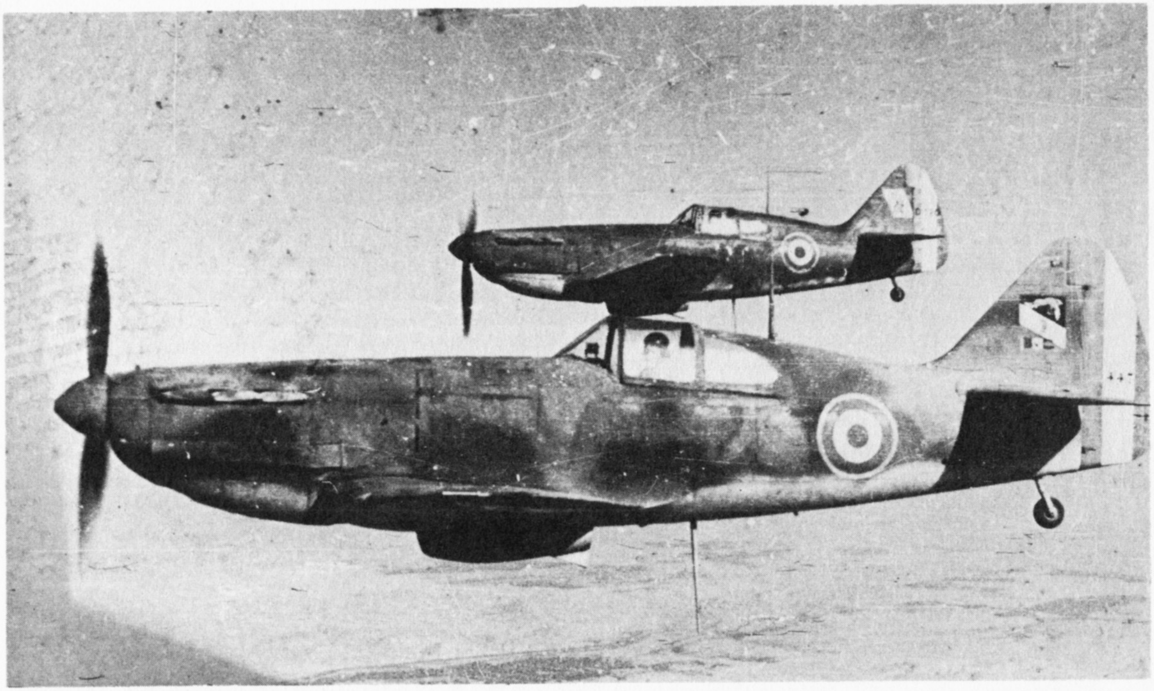


The D 520 saw little action with the Allies in North Africa following the success of "Operation Torch". A major factor was the shortage of spares, and the training schools which finally received the aircraft inherited these considerable difficulties. Eventually, the D 520 units were all re-equipped with Bell Airacobras or Supermarine Spitfires during the period following the invasion.

Back in France, the success of "Operation Torch" resulted in the occupation of the Free Zone by the Germans and the disbandment of the Armistice Air Force on November 27, 1942. The Germans took over 246 D 520s on the Armistice Air Force's inventory at this date and also pre-empted 19 completed aircraft at the SNCASE's Toulouse factory. The SNCASE was told to stop work on D 520 production, but was given a contract in the Spring of 1943 to complete 150 partially-finished airframes at Toulouse. These were all delivered by June 1944 and were the last D 520s to be built, bringing the final production total up to 905.

The first of the seized Dewoitines were put into service by the Luftwaffe in the Spring of 1943 and they were used as advanced trainers by some units based in the occupied territories of the Soviet Union. It is said that they were occasionally used on operations against the Russians but this cannot be confirmed. Three German fighter training wings also used the D 520—JG 103, based in Austria, and JG 101, based at Pau in France, were partially equipped with the D 520, while JG 105, at Chartres in France, was entirely equipped with the type. The D 520's attrition rate in Luftwaffe service was high and few survived the war in German hands, although about 55 were recaptured by the Allies after D-Day, as mentioned later.

The Germans passed on a considerable number of D 520s to their Allies. No fewer than 120 were delivered to Bulgaria and, ironically, were later used against its former Axis ally when Soviet forces occupied the country. Romania operated a small number of Dewoitines on the Eastern Front against the Soviets, but there are no details of their service there. The Italian Regia Aeronautica received 60 D 520s and these were



After the Allied invasion of North Africa, the D 520 was relegated to the training role. These two were serving with the Ecole d'Application du Personnel Navigant at Marrakesh in 1943; the aircraft in the foreground, No. 447, carries the insignia of both Escadrilles of GC I/4 and the 4th Escadrille, GC II/6. The rear D 520 carries the insignia of the 4th Escadrille, GC II/6 only (E.C.P.A.)

Pilots, mechanics and D 520s of the Groupe Doret in November 1944. Note the mottled camouflage on the noses and tails of these aircraft (Camouflage Air Club)

issued to four second-line training units (the 13°, 22°, 24°, and 167° Gruppi).

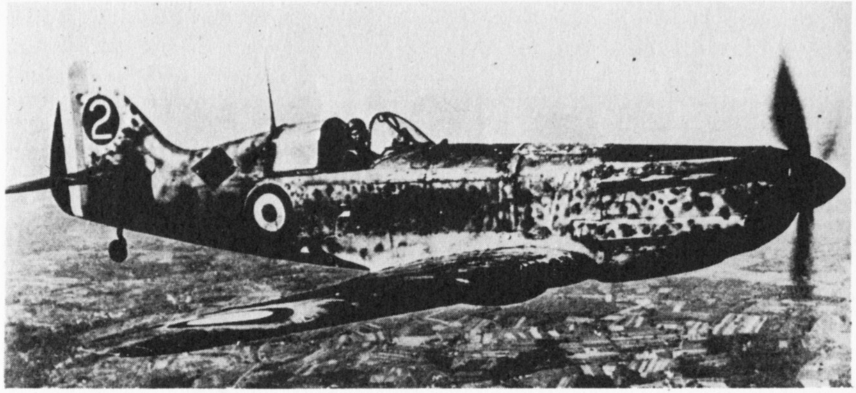
Perhaps to compensate for lost opportunities in 1940, the D 520 was able to take part in the liberation in France, albeit on a modest scale. Following the invasion of South-West France, a fighter unit was formed as part of the Forces Françaises de l'Intérieur (FFI). Officially known as the 1st Groupe de Chasse FFI, this unit was better known as the Groupe Doret, after its leader, and included some of the élite French pilots. This unit was equipped with the D 520 and comprised two Escadrilles, one based at Tarbes and the other at Toulouse. Only a small number of operations, mostly ground attack, was flown by this unit, but it was good for France's morale to have its pilots flying home-produced aircraft against the enemy.

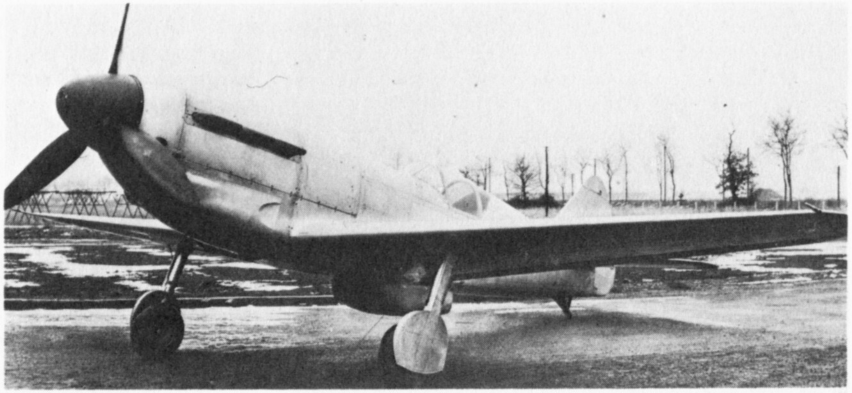
In November 1944, after some three months of operations and reconnaissance flights, the Groupe Doret was incorporated into the Groupement Patrie but, on December 1, 1944, after reorganisation of the French Air Force, it became GC II/18. The D 520s of GC II/18 were replaced by Spitfires late in February 1945 and the aircraft were handed over to GCB I/18 to supplement the latter unit's Douglas Dauntless dive-bombers. Altogether, about 50 D 520s were "re-acquired" from the Germans in the liberated areas of France during the latter stages of the war. Fifteen or so were brought back from North Africa when the Centre d'Instruction de Chasse (CIC) at Meknes handed them over in mid-1945.

About 40 Dewoitine D 520s survived the war and these were used for training for several years. A two-seat tandem trainer version was developed by the simple expedient of squeezing a second seat in behind the original cockpit. Approximately a dozen such conversions were made, these being designated D 520DC (Double Commandes—Dual Control). The last D 520s were withdrawn from flying status in September 1953, although several examples remain on display in various parts of France.

* * *

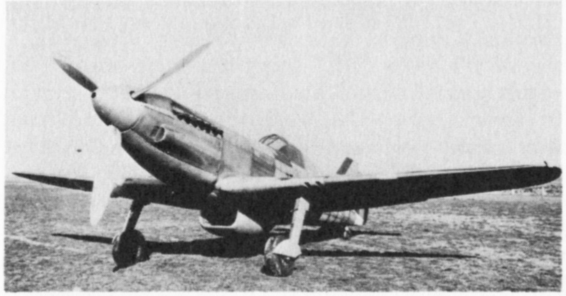
To complete the story of the D 520, mention must be made of variations on the design which carried different type numbers. The first was the D 550, intended for an attack on the world speed record for aircraft. The D 550 was

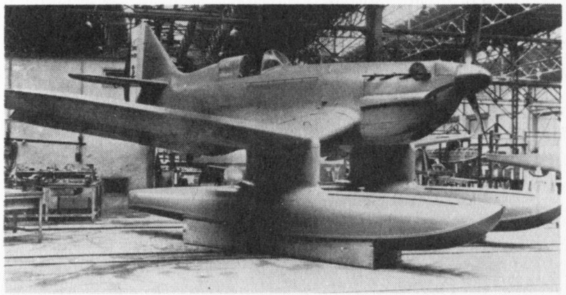




Above: *A D 520 operated by GCB I/18 in the Spring of 1945. This unit was re-equipped with Dewoitines when GC II/18 received Spitfires* (Musée de l'Air)

Top right: *The first D 551, completed without armament in January 1941 under the designation 'D 560'. The Germans would not allow the aircraft to be flight tested and it was subsequently scrapped* (Sud-Aviation)





Above centre: *The SE 520Z survived the war but was never properly tested* (Archives UPE)

Above bottom: *This floatplane fighter, based on the D 520, was known as the Dewoitine HD 780; like so many French designs its career was abruptly terminated in June 1940* (Archives UPE)

smaller and lighter than its parent and was fitted with a specially-boosted Hispano-Suiza 12Y Crs engine for its initial flight trials, which started on June 23, 1939. After being fitted with a 1,300 hp 12Y engine, the D 550 achieved a maximum speed of 436 mph (702 km/h) at 19,680 ft, becoming the first French aircraft to exceed 700 km/h in level flight. The June 1940 Armistice put an end to testing of this aircraft, which survived the liberation and damage by Allied bombing but was eventually sold for scrap.

The Dewoitine design team suggested that the D 550 could be adapted as a fighter and this was accepted by the Air Force technical department. The first proposal, also known as the D 550, embodied only a minimal amount of modification, being powered by a 12Y 51 engine, carrying enough fuel for only 60 minutes flight at cruising speed and armed with a single 20-mm cannon firing through the propeller hub. An order was placed for two prototypes, but it was later cancelled in favour of a more extensive rework known as the D 551.

The D 551, also powered by a Hispano-Suiza 12Y 51, featured an enlarged wing and more of the accoutrements necessary to produce a fighter than were present in the original proposal. Armament was specified as being either four wing-mounted 7·5-mm machine-guns or two wing-mounted machine-guns and a 20-mm cannon firing through the propeller hub. With a maximum take-off weight of 4,850 lb, the D 551 had an estimated maximum speed of 420 mph and the ability to climb to 13,120 ft in 3 minutes 50 seconds.

An order was placed for 10 D 551s and two D 552s in Contract 528/0 of January 1940. The D 552 was intended to be powered by the Hispano-Suiza 12Z and to have a wing of increased area carrying six 7·5-mm machine-guns. It was also intended that the D 552 should replace the D 551 on the production lines after 200 had been built. The number of aircraft on order to Contract 528/0 was increased to 16 in February 1940 with the addition of four special high-altitude photo-reconnaissance variants based on the D 551.

Work on Contract 528/0 proceeded quickly and five airframes were ready for flight trials by the end of May 1940, lacking only the aero-engines. Dewoitine himself ordered a further two D 551s to be built without an official order, but the Armistice stopped work on the project before any aircraft could be flown. The Germans allowed two aircraft to be completed as unarmed "sports aircraft", designated D 560, but then refused to allow flight trials to proceed when the first was ready to fly in January 1941. All completed and semi-completed airframes were subsequently scrapped.

Dewoitine D 520 Specification

Type: Single-seat fighter; low-wing, all-metal monoplane with monocoque fuselage and retractable main undercarriage.

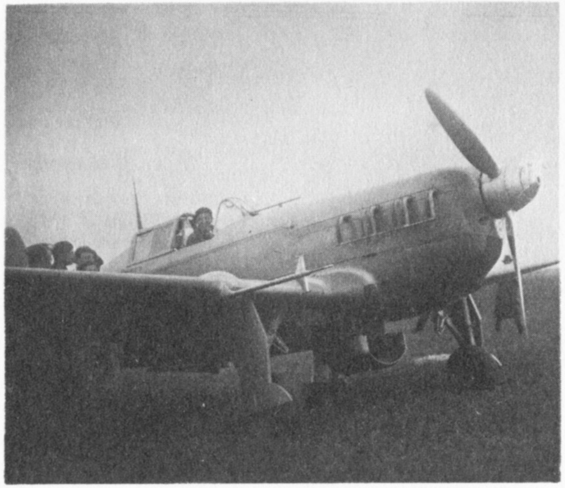
Powerplant: One Hispano-Suiza 12Y 45 12-cylinder liquid-cooled Vee inline rated at 930 hp for take-off and 920 hp at altitude (this applied to 558 aircraft, the remainder had the 12Y 49 rated at 900 hp for take-off and 910 hp at altitude).

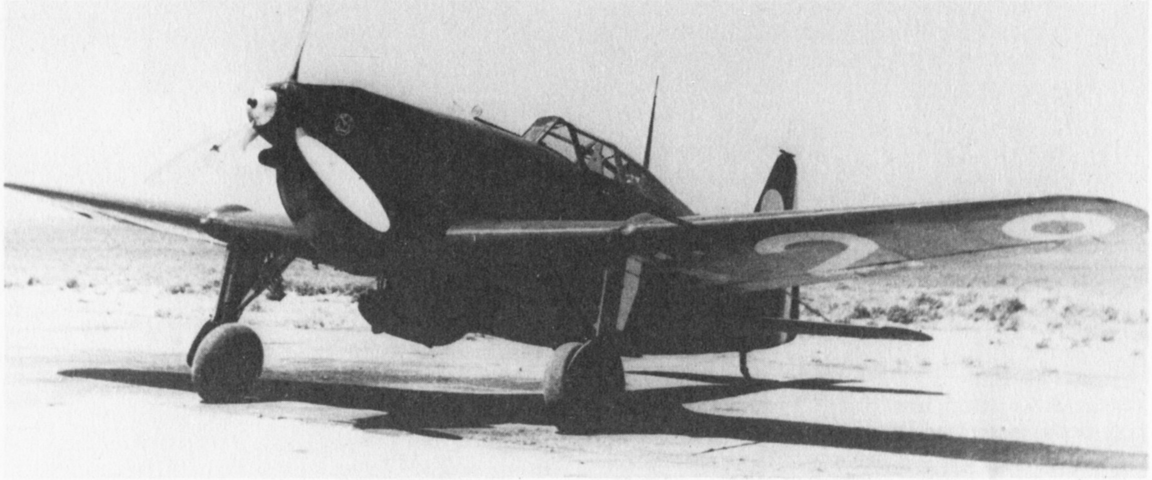
Armament: One 20-mm Hispano HS-404 cannon with 60 rounds firing through the propeller hub and four 7.5-mm MAC 1934 M39 machine-guns with 675 rounds per gun in the wings.

Dimensions: Span, 33.46 ft; length, 28.73 ft; height (tail down), 8.43 ft; wing area, 171.89 sq. ft.

Weights: Empty, 4,679 lb; normal loaded, 5,900 lb; maximum take-off weight, 6,144 lb.

Performance (with 12Y 45 engine): Maximum speed, 332 mph at 18,040 ft; climb to 19.680 ft, 8 min 59 sec; service ceiling, 33,620 ft; landing speed (flaps down), 81 mph; maximum range, 956 ml at 230 mph at 16,730 ft.





Above left: *The first prototype MS 405 seen in July 1936 with the well-known pilot Michel Detroyat in the cockpit* (via the author)

Above right: *Pre-production MS 405s were issued to certain Air Force units for evaluation during 1937-39. MS 405 No. 2 was for a time with GC I/8, which eventually re-equipped with the MB 151/152. The 15 MS 405s received the matricules militaires N-251 to 265; this is N-252* (Dr Rivière)

Morane-Saulnier MS 406

With its origins in a French Air Ministry Specification of 1934 for a single-seat fighter, the Morane-Saulnier MS 406's early career paralleled that of the Hawker Hurricane and Messerschmitt Bf 109. The course of history determined that the MS 406 did not achieve the stature of these latter types and it remains in the memory today only as France's most numerous fighter of World War 2, a fighter with pleasant flying characteristics but otherwise undistinguished. By virtue of its design, the MS 406 proved to be vulnerable to battle damage in a way which did not afflict its more illustrious comtemporaries, and its "kill to loss" ratio was the worst of the French Air Force's single-seat fighters, the Bloch MB 151/152 not excepted.

The 1934 Specification called for considerable improvement over the Dewoitine D 500-series fighters and all the resulting prototypes were of relatively modern conception. Morane-Saulnier submitted the MS 405 design and its competitors included the Bloch 150, Dewoitine D 513, Loire 250 and Nieuport 161. Although the Air Ministry did not "freeze" the design finally until late in 1935, Morane-Saulnier had wasted no time. In fact, the design was ready early in 1935 and construction of the first prototype at Puteaux, near Paris, begun in secret. The prototype, MS 405-01, made its first flight on August 8, 1935 at Villacoublay piloted by Michel Detroyat. It appeared as a slightly dumpy low-wing monoplane powered by a Hispano-Suiza 12Y grs 12-cylinder liquid-cooled Vee inline, which was designed to mount a 20-mm cannon between the cylinder banks. For the first few flights the undercarriage was locked in the "down" position. The MS 405-01 was sent to Villacoublay for official trials in January 1936, after some 80 hours of manufacturer's tests, and there achieved a maximum speed of 298 mph at 13,120 ft. A few minor changes were made to the wing design as a result of these trials.

Such was the promise of the MS 405 that the competition was to all intents and purposes won and Morane-Saulnier could confidently expect an official order. The planned reform of the French aircraft industry delayed the placing of an order until March 1937, but before this date Morane-Saulnier was told that a pre-production batch of 15 MS 405s would be ordered. Meanwhile, however, the company had been building a second prototype, the MS 405-02, and this differed in some detail from the first. Changes included an altered wing planform, a Hispano-Suiza 12Y crs engine was fitted with the propeller drive geared down from 48:51 to 2:3. The MS 405-02 went to the CEMA for official trials in June 1937, at which time the MS 405-01 was being exhibited at the Brussels Aero Show. The two prototypes were shown together at the Le Bourget Air Meeting on July 18, 1937, but 11 days later the second crashed, killing the French pilot. Just over five months' later, the MS 405-01 also crashed—at Villacoublay on December 8—while being flown by a Lithuanian pilot named Mikenas, who was also killed.

The MS 405 pre-production order for Morane-Saulnier, which was not nationalised, was confirmed in March 1937 by Contract 274/7 and the 15 aircraft were built at Puteaux and assembled at Villacoublay. Before work was very far advanced, it was decided that the production version was to be revised and accordingly it was given a separate designation, the MS 406. The contract was altered over the next few months and finally called for 15 MS 405s and one MS 406 as a pattern aircraft. The MS 405s carried the production numbers one to 15 and that of the pattern MS 406 was No. 1061. A further modification to the original order resulted in MS 405 No. 4 being converted into the "prototype" MS 406 (also known as the MS 406-01), and

MS 405 No. 14 being converted into the MS 407 No. 1.

Like the MS 405-02, pre-production aircraft were normally fitted with the 12Y crs and they were structurally identical to this second prototype with the exception of No. 12 which featured a new wing with a reduced set of ribs which enabled a weight saving of some 50 lb. The first of the batch was initially flown on February 3, 1938 and all had been completed by the year's end. Among the modifications to MS 405 No. 4 to turn it into the MS 406 prototype were the installation of a Hispano-Suiza 12Y 31 engine and the fitting of a Chauvière propeller. No. 12 first flew in October 1938 and was subsequently modified to take a 950 hp Hispano-Suiza 12Y 45 engine, while No. 13 was altered in various details to become the MS 408. The MS 407LP (Lance Parachute) was a modification of MS 405 No. 14 to study high-speed parachute dropping, the fuselage fuel tanks being replaced by a compartment. Known after modification as the MS 407 No. 1, it first flew on December 7, 1938 and two other MS 407s were subsequently built to Contract 1399/8, although early in 1940 all three were re-converted to production MS 406 standards.

The first main production order, Contract 327/7, was placed in April 1937, when the newly formed Société Nationale de Constructions Aéronautiques de l'Ouest (SNCAO) was chosen to build 50 MS 405s at Nantes. This order was revised to cover 50 MS 406s (with production numbers 16 to 65, consecutive to the MS 405s) and on August 10, 1937 a further 80 MS 406s were ordered. Successive orders were placed until April 1938, when the Plan V re-equipment scheme was published, by which time a further 825 had been contracted. This was divided between three of the nationalised companies: SNCAO, Nantes-Bouguenais, 325 (Contract 1202/7); Société Nationale de Constructions Aéronautiques du Midi (SNCAM), Toulouse, 130 (Contract 423/8); and Société Nationale de Constructions Aéronautiques du Centre (SNCAC), Boulogne-Billancourt, 370 aircraft (Contract 768/8). In spite of being a non-nationalised company and supposedly ineligible for a military contract, Morane-Saulnier was brought into the production scheme in the Summer of 1938 with an order for 90 aircraft (production numbers 971–1060) to be built at Puteaux under Contract 1154/8.

The nationalised companies' production programmes for the 905 MS 406s (Nos. 66–970) were revised in October 1938 by Contract 1959/8. As a result, all aircraft were to be assembled at SNCAO, Nantes, which also produced the main fuselage section. The SNCAM was to produce the tail sections and SNCAC the mainplanes.

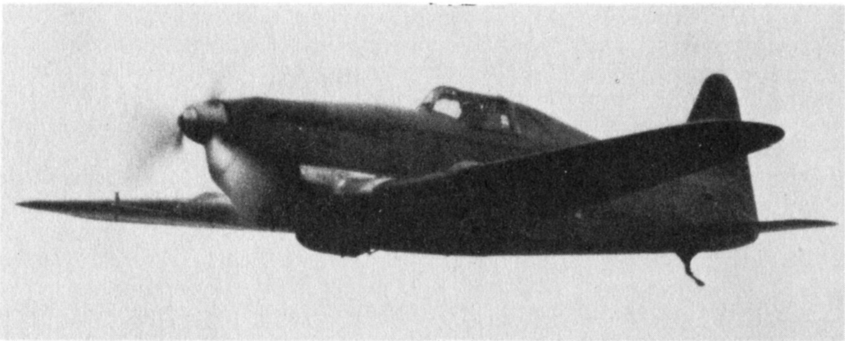
Production took a considerable time to get under way, despite the French Air Force's desperate need for modern fighters. The chief reason for delay was the low rate of production of aero-engines—in this case, Hispano-Suiza 12Y 31—although there was also a shortage of various other items of equipment.

In an effort to increase engine availability, negotiations were completed with the Czechoslovak Skoda company to supply 25 Hispano-Suiza 12Y engines a month. However, Germany annexed Czechoslovakia before the benefits of this arrangement could be felt and only about 60 were delivered. The situation was viewed so seriously by May 1939 that the Soviet Union was approached to approve the sale of 200 M-100 engines (licence-built Hispano-Suiza 12Y motors), but without success. A last effort was made later that year when the Swiss Saurer and SLM companies were given contracts for 12Y engines. It is not known whether any were delivered and the aero-engine shortage continually affected MS 406 production, even if only from the spares viewpoint in the later stages.

The last production order for the MS 406 which can be quoted with any certainty was Contract 1052/9 for eight aircraft (Nos. 1062–1069) to be paid for by private subscription, placed before the outbreak of the war. Thirteen aircraft ordered by Lithuania were taken over in the Summer of 1939 and became Nos. 1070–1082. The exact total manufactured was 1,098—broken down as two prototype and 15 pre-production MS 405s and 1,081 MS 406s.

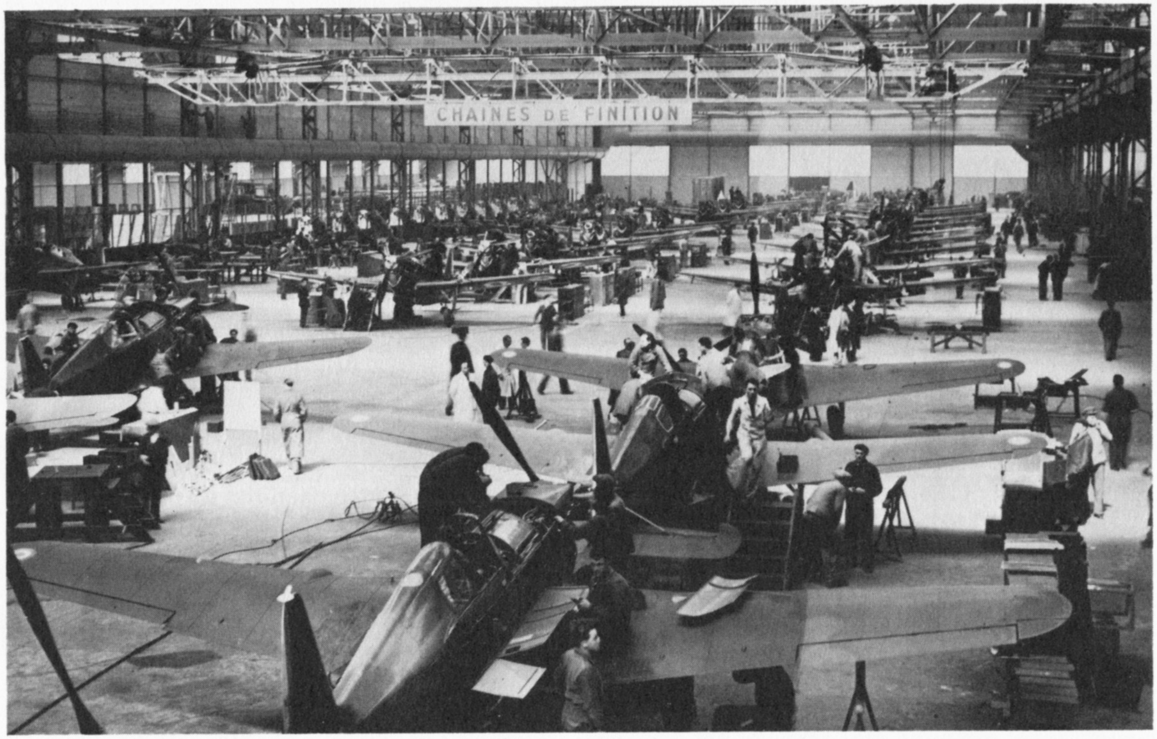
As production got under way, a number of modifications was introduced in the light of operating and, later, operational experience. Aircraft delivered from January 1939 onwards featured a strengthened undercarriage; then a turnover crash pylon aft of the pilot's seat was introduced in August 1939 and this was followed the next month by re-inforced elevator coverings and tailplane leading-edges.

Preliminary combat reports in the Autumn of 1939 showed that the MS 406 suffered from a number of shortcomings. Briefly these were: the vulnerability of the various electrical, hydraulic and pneumatic actuator circuits to enemy fire; the low horsepower of the aero-engine; and the inadequacy of the armament, which suffered from freezing-up at altitude and low weight of firepower—although the 20-mm cannon was



Below left: *The MS 405-01 during early flight trials. This aircraft was later shown at the 1937 Brussels Aero Show and eventually written off in December 1937, killing a Lithuanian pilot* (Interavia)

Below right: *The fourth pre-production MS 405 became the 'prototype' MS 406 and is seen here after modification* (ECPA)



The MS 406 final assembly lines at Nantes-Bouguenais in 1938; note the small-diameter upper wing roundels. MS 406 Nos. 16-581 had matricules militaires in the range N-266 to 999, but there were gaps in the allocation. Nos. 582-621 were L-521 to 560 and Nos. 622-970 were L-651 to 999. All these aircraft were built by the nationalised industry (via the author)

appreciated. Minor modifications were easily effected, such as the provision of cockpit and armament heating, an improved gunsight and armour behind the pilot. These modifications were often undertaken by combat units and some aircraft were also fitted with a rear-view mirror. Some late-production aircraft were modified to carry a flush-fitting auxiliary fuel tank under each wing.

In February 1940, it was decided, systematically, to embody the most easily effected improvements to the aircraft by progressively converting all MS 406s to MS 410 standards. (The MS 408 has already been mentioned and the MS 409 and MS 411 were projects for versions with fixed radiators and other improvements.) The MS 410 featured a re-inforced wing armament of four belt-fed 7·5-mm MAC 1934 M39 machine-guns with 550 rounds per gun, exhaust heating for the cockpit and wings, electro-pneumatic armament actuation in place of the MS 406's pneumatic system, and attachment points for auxiliary fuel tanks. In addition it was proposed that the MS 410 should have a non-retractable radiator, such as was used on the Swiss D-3801 mentioned later. The first MS 406 converted, No. 1028, had the fixed radiator, but the second, No. 1040, reportedly did not.

Contract 1022/0 called for a first series of 500 MS 406s to be modified to MS 410 standards, preference being given to new aircraft stocked at EAA 301, Châteaudun, or those in good condition with the squadrons (in both cases aircraft with Ratier propellers received priority). The main work involved the manufacture of 621 sets of wings, this total including spares. Only four conversions had been completed by May 10 and about 20 aircraft were in the course of modification. Work was stopped almost immediately because of the front-line units' urgent need of replacement aircraft—the MS 406 units being the hardest hit by the initial German attacks—and 150 sets of completed replacement wings were put into storage.

None of the completed MS 410s was put to operational use. The partially converted aircraft were completed after the Armistice and some were among the Moranes sold to Finland in 1942. There were also several "hybrid" aircraft assembled during 1940–42, these having some but not all of the modifications, for example, belt-fed guns but old-style windscreen, or provision for extra fuel tanks but unchanged wing armament and retractable radiator.

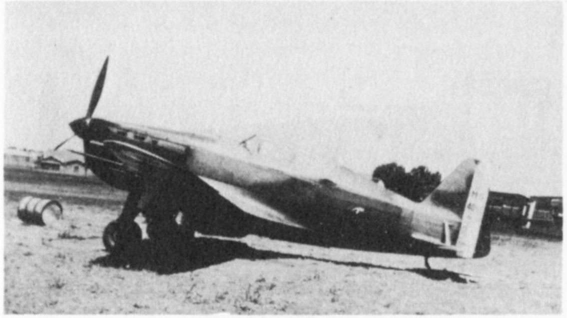
Considerable overseas interest was shown in the MS 406 and a number of export orders was secured, while licence-production was undertaken in Switzerland. This aspect of the MS 406's career is dealt with at the end of this chapter.

* * *

Two of the pre-production MS 405s were supplied to the 2nd Escadrille of the 7th Escadre de Chasse for service testing during 1938 and, despite some minor troubles, the type made a good impression. Following these tests, certain of the initial modifications already listed above were incorporated into production MS 406s, which began to reach the French Air Force in the late Autumn of 1938.

The first unit to re-equip with the MS 406 was the 1st Escadrille of the 6th Escadre de Chasse (GC I/6), which exchanged its Loire 46s for the new fighter between December 1938 and January 1939. Although only 27 MS 406s were taken on charge in 1938, the production rate began to pick up and 932 had been received by the end of 1939 (this latter total does include some export aircraft, for example, those for Turkey). Units began to re-equip with the type at an encouraging tempo and, by July 1939, the 2nd, 3rd, 6th and 7th Escadres were all operating the MS 406. Each Escadre comprised three Escadrilles and they were based as follows: GC I/2, II/2, III/2, II/6 and III/6 at Chartres; GC I/3, II/3, III/3, II/7 and III/7 at Dijon; and GC I/6 and I/7 at Blida, in Algeria.

On mobilisation, seven of the 13 Groupes de Chasse ready for combat were flying the MS 406. Of the MS 406 Groupes, four were part of Groupement de Chasse 21, namely GC I/2 (based at Beauvais-Tille, GC II/2 (Clermont-les-Fermes), GC III/2 (Cambrai-Niergnies), and GC III/6 (Villacoublay); two were in Groupement 22,



Above top: *An MS 406 of GC I/2 photographed in 1939 before the outbreak of the war* (Archives Botquin)

Above centre: *Capitaine Williame, who later scored seven confirmed victories in 1939-40, 'baptises' an MS 406 of GC I/2 at Beauvais before the war's outbreak* (Archives Botquin)

namely GC I/3 (Velaine-en-Haye) and GC II/7 (Luxeuil); and one, GC II/6, was in Groupement 23. In addition to their usual fighter duties, GC III/2 and II/7 were designated to provide support for the 1st and 4th Armies respectively.

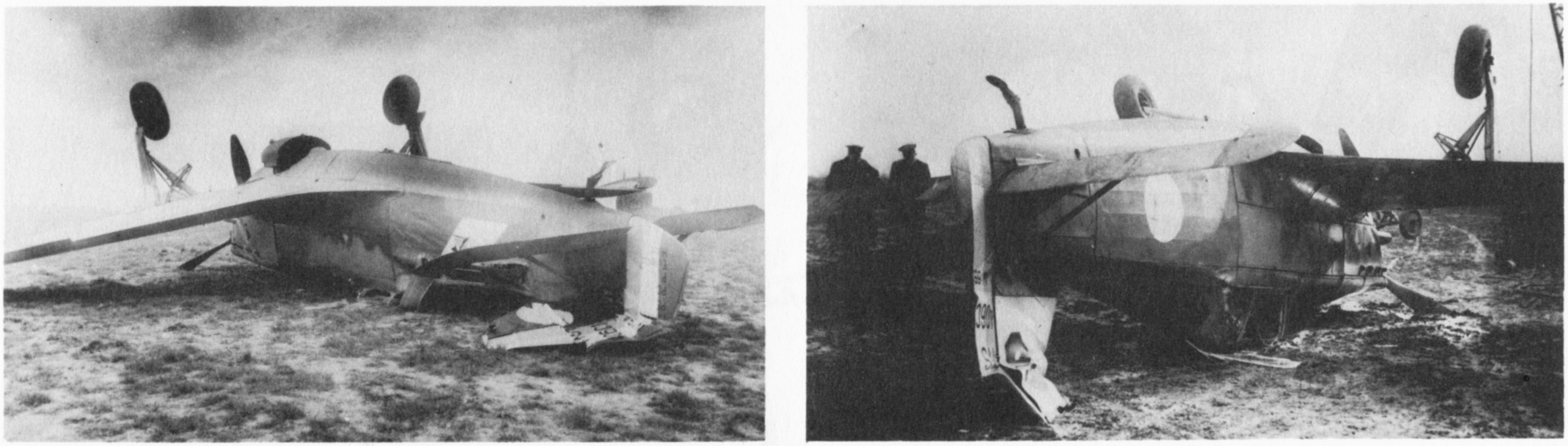
The "Phoney War" period was fairly active for the Moranes. Their duties involved escorting army co-operation and reconnaissance aircraft, attempting to intercept enemy reconnaissance sorties and, on occasion, small-scale fighter versus fighter actions. As noted earlier, a number of weaknesses became apparent in the Morane, including the widespread complaint among French fighters of the guns freezing-up at altitude.

Between September 3, 1939 and May 10, 1940, MS 406 pilots claimed 32 confirmed kills and 16 probables, for the loss of 13 shot down and another 33 written-off in the front-line units.

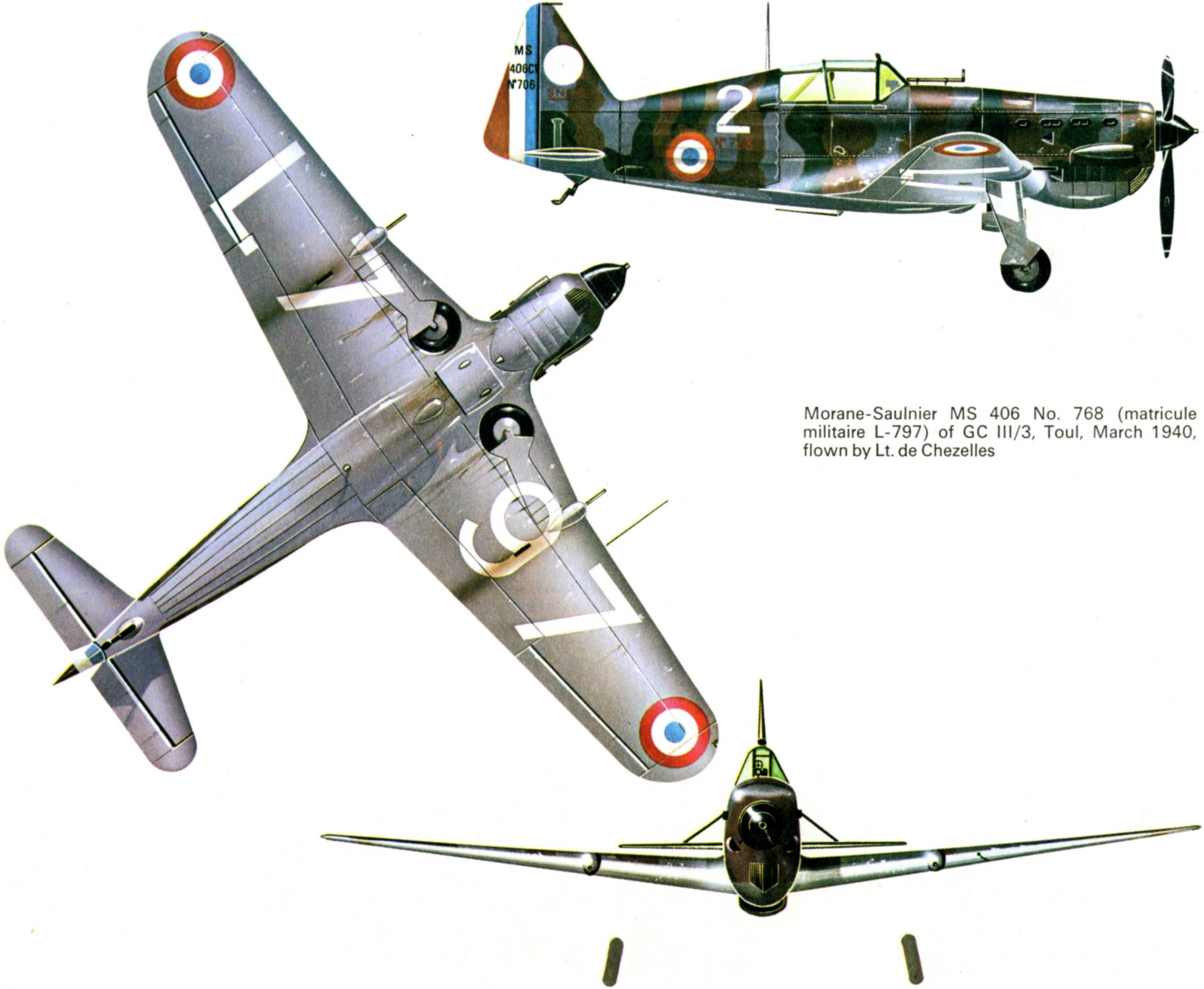
It had been intended to start replacing the MS 406 by more modern aircraft during the Spring of 1940, but the only unit to have completely converted by the time of the German invasion of France and the Low Countries was GC I/3. This unit became operational on the Dewoitine D 520 during the early days in May, having scored five confirmed and one probable victory with the MS 406.

The front-line MS 406 units were deployed as follows on May 10, 1940: in Groupement 21—GC III/3 (at Beauvais); Groupement 22—GC I/2 (Toul-Ouchey), GC II/6 (Anglure-Vouarces); Groupement 23—GC II/2 (Laon-Chambry), GC III/7 (Vitry-le-Francois); Groupement 24—GC II/3 (Le Luc, converting to D 520), GC I/6 (Marignane), GC III/6 (Chissey), GC II/7 (Luxeuil); Groupement 25—GC III/1 (Norrent-Fontes), GC III/2 (Cambrai-Niergnies). In addition, GC II/9 was out of active service at Marignane while converting to the MB 152. Also there were several units outside Metropolitan France equipped with the MS 406, including: North Africa—GC I/9 and I/10 (fully-equipped with the MS 406), and GC III/5 (one Escadrille); Syria—GC I/7; Indo-China—Escadrille de Chasse 2/595.

The Morane-equipped Groupes de Chasse appear to have suffered most under the impact of the initial German attacks of May 10 and the succeeding few days. GC II/7 lost no fewer than nine MS 406s to Luftwaffe ground-attack sorties on May 10 and was soon withdrawn to convert to the D 520. Other battered units followed: GC III/2 was also hit badly by ground-strafing attacks and converted to the Hawk 75A, while GC II/6 was re-equipped with the MB 152. There was a considerable number of MS 406s in reserve, but the type's shortcomings were obvious and it was decided to try and convert all France-based units to the D 520. In the event, time ran out before this could be completely effected but



Below: *The MS 406 design was improved as production progressed and these photographs show the benefit of the turnover pylon. No. 94 of GC II/6, 4th Escadrille, did not have this fitted when it crashed in April 1939* (*Left*), *while No. 599 of the 6th Centre d'Instruction de Chasse, at Chartres, had a turnover pylon when it crashed in April 1940* (*Right*). *Note the difference in damage to the cockpit area* (Dr Rivière)


MS
406C1
N°706
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2
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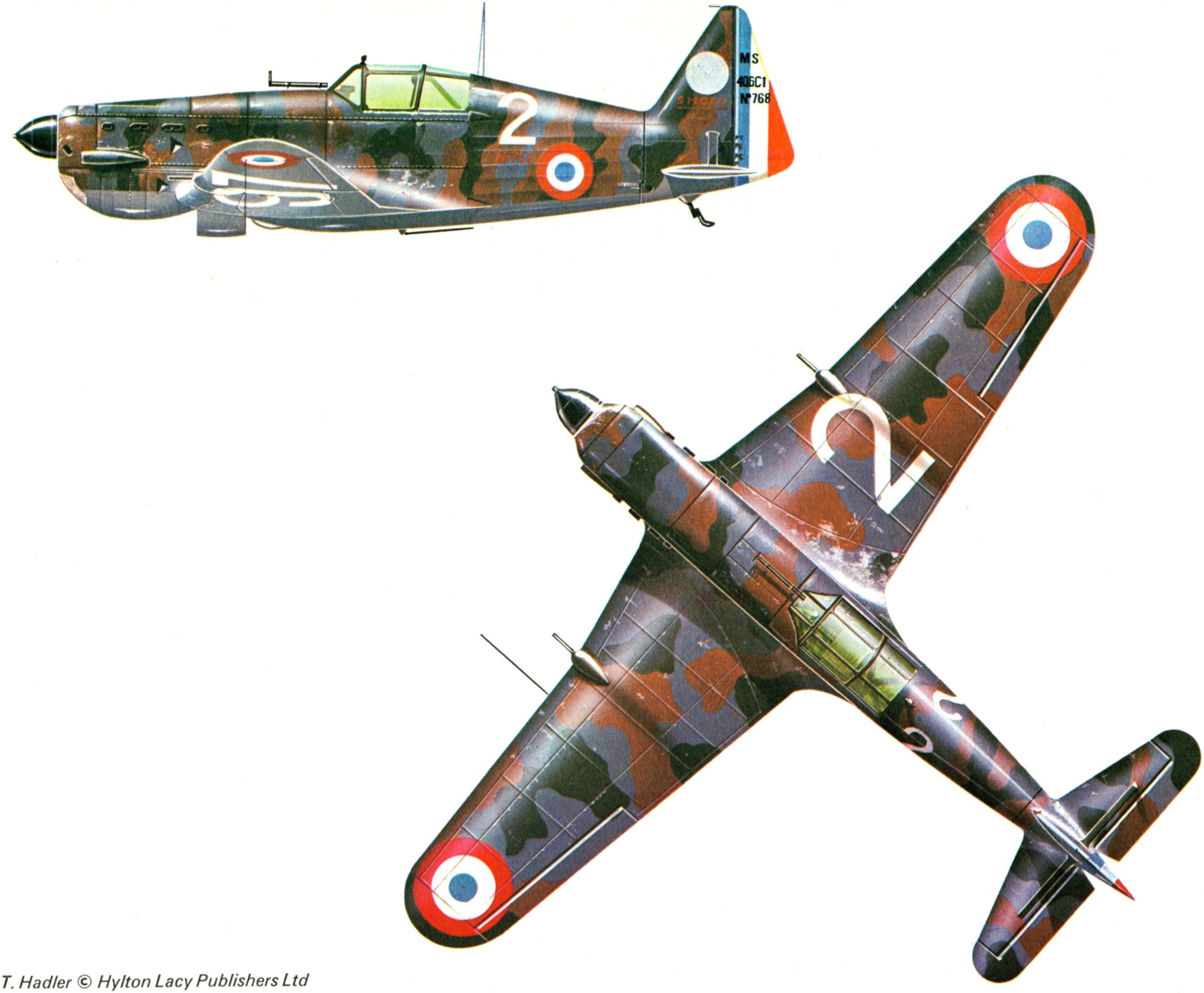
Morane-Saulnier MS 406 No. 768 (matricule militaire L-797) of GC III/3, Toul, March 1940, flown by Lt. de Chezelles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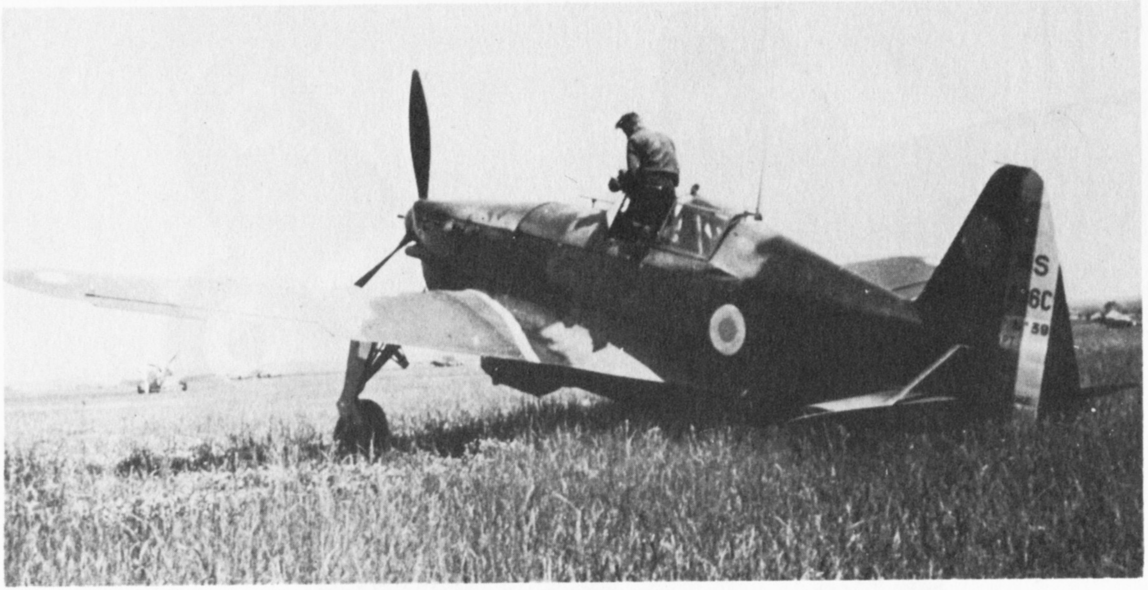
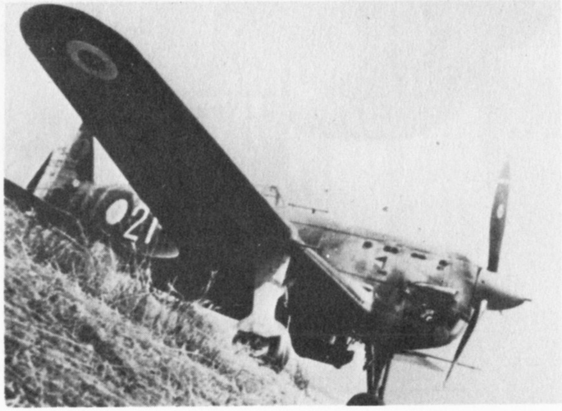


Left: *This splendid 'atmosphere shot' of MS 406 No. 397 shows to advantage the turnover pylon aft of the pilot and the rear-view mirror fitted to some aircraft* (ECPA)

Below: *No. 721 was with GC III/I in the spring of 1940.* (Archives Botquin)



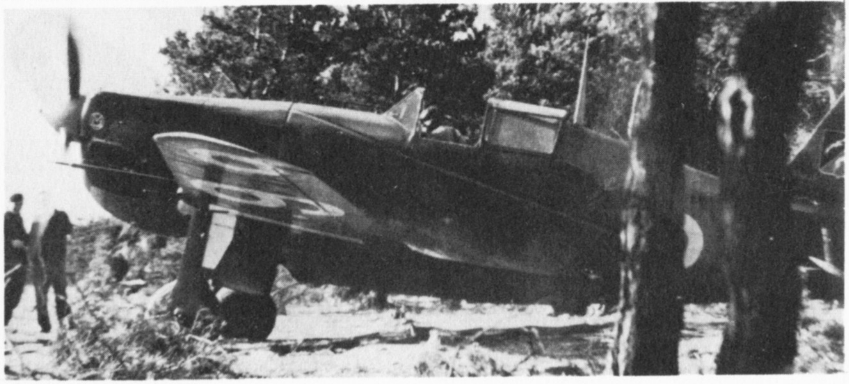
it had got under way during the latter half of June.

By the Armistice, only four Groupes were still equipped with the MS 406 in France: GC III/1 (at Marignane); GC I/2 and II/2 (both at Nimes) and GC I/6 (Salon-de-Provence). In addition the Aéronavale Escadrille AC5, at Hourtin, was flying the MS 406 and a member of this unit, Quartier-maître Pivet, was the last French pilot to be lost in action before the Armistice. Pivet was lost to "flak" near Royan during a reconnaissance mission on the afternoon of June 24, 1940—a little later than Lt. Raphenne of GC I/6, also with Moranes, formerly considered to be the last French aviator lost.

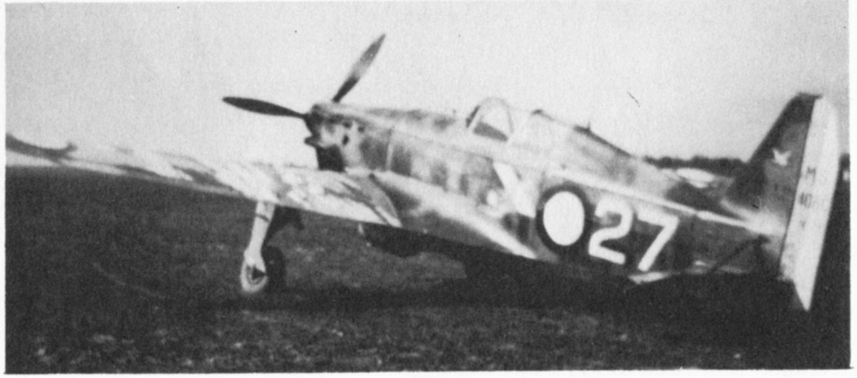
Several of the Escadrilles de Chasse de Défense were equipped with the MS 406, as well as the Groupe de Chasse de Marche Polonais at Lyon. This Polish-crewed unit included 11 Moranes taken from the CIC Polonais training unit and was credited with the destruction of a Heinkel He 111, and there may have been other unconfirmed victories for this unit. The other units included ECD 372 at Cazaux (with one or two MS 405s among its equipment), and units at Caen, Cognac, Nantes and Salon-de-Provence, this last with an MS 405.

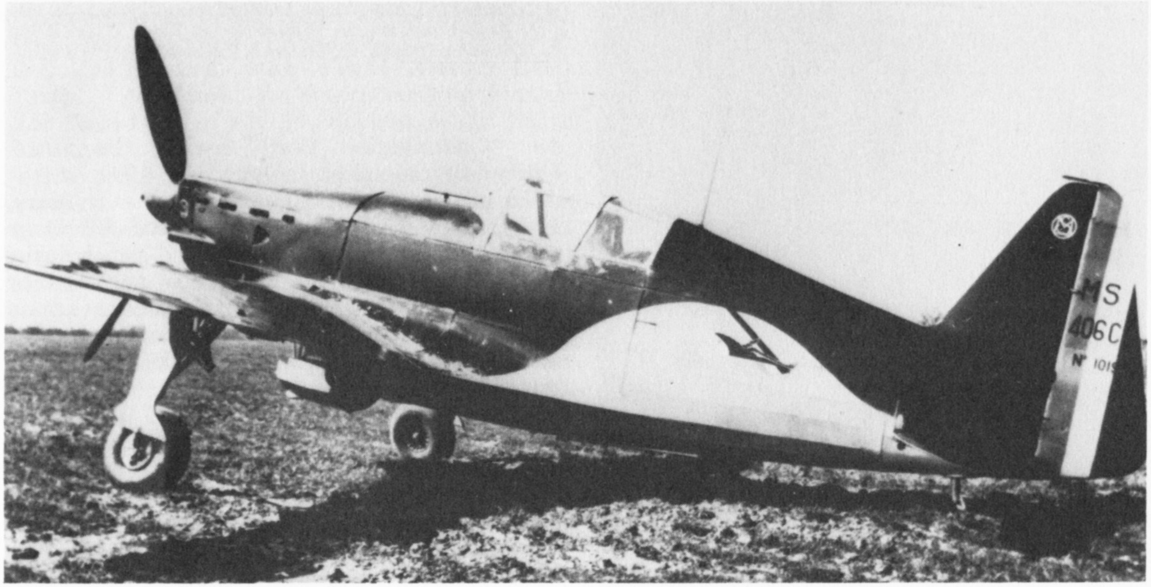
Three Groupes de Chasse in North Africa, GC III/5, I/9 and I/10, were flying the MS 406 at the time of the Armistice, while GC I/7 in Syria, and Escadrille 2/595 also operated the type. The three North Africa-based units were disbanded in the Summer of 1940, but GC I/7 remained with the type and saw action in 1941 when the British and Free French attacked Syria. During the period May to July of that year, the unit scored two confirmed and two probable victories, the latter on night fighting sorties. With

MS 406 No. 989 (matricule militaire L-579) serving with GC II/3 in April 1940 and flown by the Groupe's CO, Commandant Morlat. Aircraft Nos. 971-1060 were built by Morane-Saulnier and had the matricules militaires L-561 to 650 (C-J. Ehrengardt)



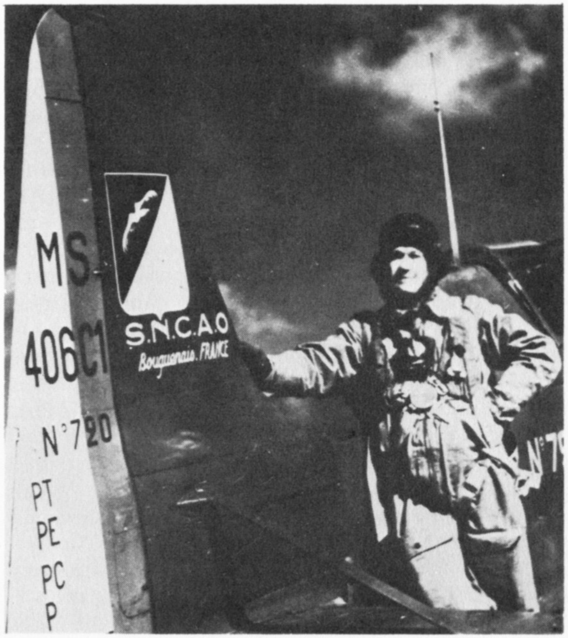
MS 406 No. 772 serving with GC III/1 and seen during the Spring of 1940 (Archives Botquin)





Left: *MS 406 No. 1019 was used as a 'hack' by General Pinsard in 1940 and based with GC II/6. All upper surfaces were painted black and the aircraft was named 'The Pirate'. The red, white and blue fuselage insignia was that of the First World War unit SPA 26* (Camouflage Air Club)

Below: *This close-up of No. 720, flown by the CO of GC II/3, Commandant Clausse, shows the standard markings painted on the rudder of all French military aircraft in 1940. On the fin are the combined insignia of the 3rd and 4th Escadrilles of GC II/3 and the manufacturer's name* (Dr Rivière)



the end of the campaign in Syria, the personnel of GC I/7 returned to France, leaving its aircraft behind, and the unit was disbanded on October 4, 1941.

Two Escadrilles de Chasse, EC 565 and 2/596, were formed with MS 406s by the Vichy Air Force. EC 565 came into existence on July 1, 1941 at Diego Suarez in Madagascar and saw action when the Allies invaded the island in May 1942. One Royal Navy Grumman Martlet fighter was shot down and EC 565 lost four Moranes.

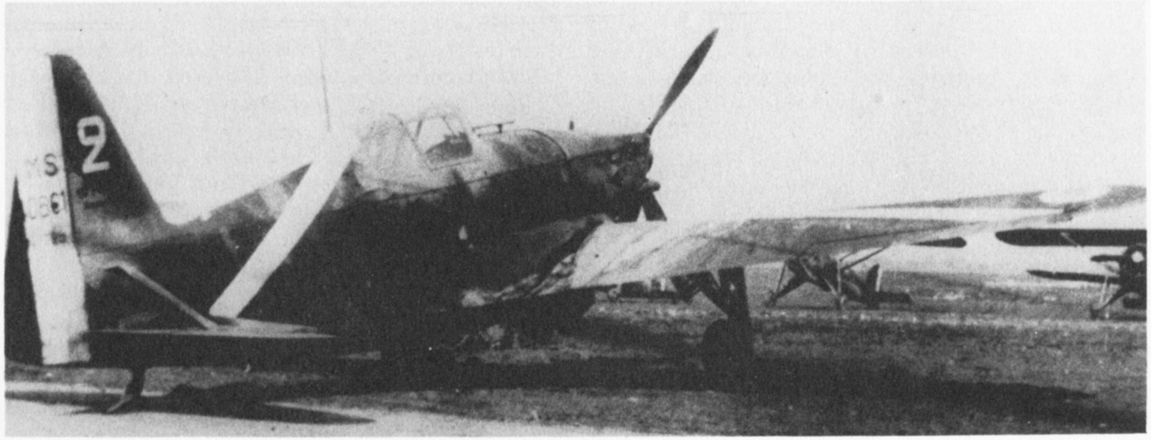
EC 2/596 was formed in Indo-China in November 1940 and, together with EC 2/595, saw some action against the Japanese and the Thais in 1940, but details of their combats have not survived, as far as is known. The Free French used a few MS 406s for training and patrol work with Escadrille de Chasse 2 and GC 1 "Alsace", in the Middle East, but serviceability was a constant problem and the aircraft were struck-off charge in 1942. The last Moranes were a few which had survived the war and were used as trainers by the test pilot school at Bretigny until 1947.

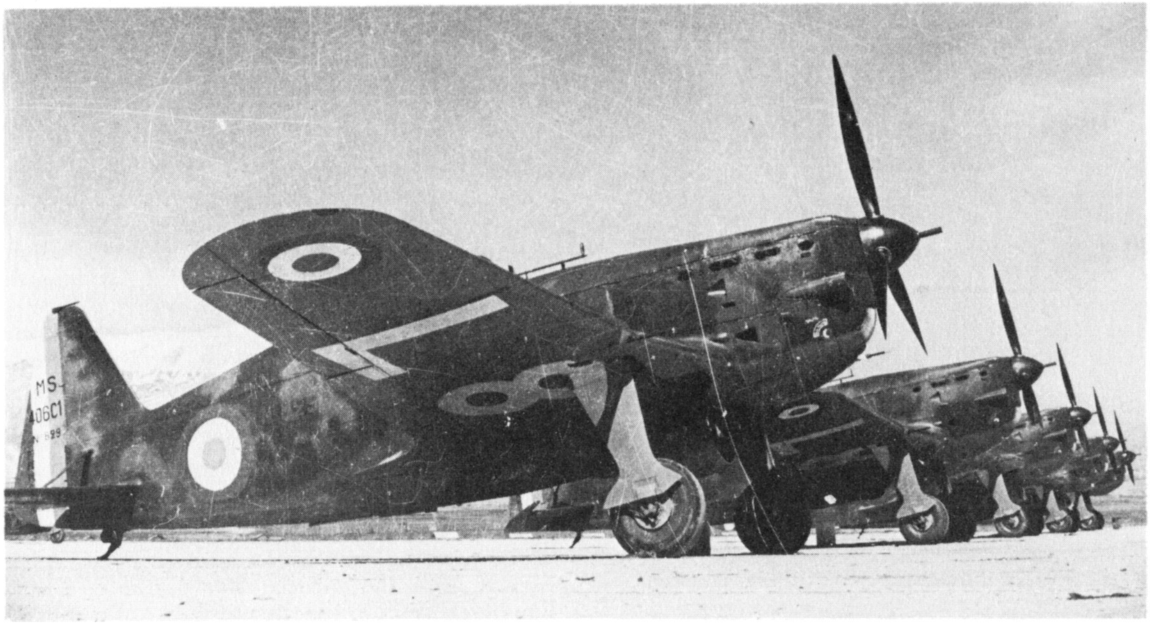
* * *

The Morane-Saulnier design attracted foreign interest from the earliest days of the MS 405. The Belgians discussed the possibility of manufacturing the Morane design for both the French and Belgian Air Forces, in 1937, but this eventually fell through. The first major breakthrough involved the sale of a production licence to Switzerland in 1938 and, in view of its diversity, this appears at the end of the chapter.

The next customer was China, with an order for 12 early in 1938. The aircraft were completed

Below: *This aircraft serving with an Operational Training Unit (OTU) at Agen in June 1940 (MS 406 No. 725) shows the diagonal white bands applied to the wings and fuselage of some training aircraft* (Dr Rivière)





GC I/7 moved to Syria in March 1940 and was still there at the time of the Anglo-French invasion of the country in June 1941. MS 406 No. 829 and others of GC I/7 are seen at Rayak in 1940 (ECPA)

and shipped out in the Summer of 1939, but the war broke out about the time they arrived in Indo-China. It is believed that one or two may have been delivered, but some (perhaps all) were seized by the French authorities in the colony and served alongside the MS 406s already in the country in EC 2/595 and 2/596.

Lithuania ordered 13 MS 406s, despite the death of a Lithuanian pilot in the MS 405-01, but the aircraft were never delivered, having been embargoed and taken over by the French Air Force when World War Two broke out. In production, these aircraft were known as the MS 406L Nos. 1–13 and the first five, at least, were acceptance-tested by a Lithuanian pilot at Bouguenais, prior to their planned dispatch in crates. They were re-numbered 1070–1082 for French Air Force use.

Three hopeful customers were thwarted for various reasons. Poland ordered 160 Moranes in May 1939, and 50 from French Air Force stocks were actually dispatched to Gdynia in September 1939. The Germans overran the country before they could be delivered. Greece tried to order 25 MS 406s, but was forced to accept the Bloch MB 151 instead and only nine of these were actually delivered. Yugoslavia ordered 25 MS 406s in April 1940 but the invasion of France precluding their delivery.

Turkey was able to receive the Morane fighter as a result of the Anglo-French-Turkish agreement of November 1939. Initially, 30 were ordered, these came from French Air Force stocks and were quickly delivered. A second batch of 15 was delivered shortly before the invasion of France and the Low Countries. Enquiries to the Turkish authorities recently as to their fate has produced no response up to the time of printing, but the MS 406 is known to have served in Turkey until about 1950.

When Finland became embroiled in the Winter War against the Soviet Union in late 1939, the French Government allowed the Finnish Government to order 30 MS 406s (again from Air Force stocks) and these were delivered in February 1940. The aircraft, which were a gift, were used to form HLeLv 28 and received the serials MS-301 to MS-330. They were used for ground strafing, although they had not yet been fitted with their engine-mounted cannons, and their pilots also claimed 16 victories for the loss of one MS 406. One pilot, Lieutenant Karu, scored three victories with the type before the fighting ceased on March 13, 1940.

Towards the end of 1940, the Germans sold 25 MS 406s, from the considerable number captured after the Armistice, to Finland and these were available to reinforce HLeLv 28 when the "Continuation War" against the Soviet Union was launched in late June 1941, in the wake of the German invasion of that country. The 20-mm engine cannon of the MS 406 made the aircraft most suitable for ground-attack duties and many sorties were made against the Murmansk railway line, one of the Russians main supply routes for lease-lend equipment. The Finns also provided their MS 406s with extra armour plating.

Seventy-four MS 406s had been thoroughly overhauled in France after the Armistice, incorporating some MS 410 improvements, German radio equipment, and a tailwheel in place of the usual skid. Some of these were delivered to Croatia and 32 were delivered to Finland in 1942–3—the 57 supplied subsequent to the June 1940 Armistice in France receiving the serials MS-601 to MS-657. In addition to making good HLeLv 28's losses, some of the latter batch were used to strengthen TLeLv 14, a reconnaisance unit which also had Netherlands-built Fokker D.21s. The MS 406 was very popular with its pilots and the only real complaint by the Finns was over difficulties with its electrical system. However, by 1944 the type was becoming outclassed by the majority of its USSR opponents.

To improve the performance of the MS 406 it was decided to fit the 1,100 hp Soviet-built Klimov M-105P engine, a development of the Hispano-Suiza 12Y, into the French airframe. The first conversion was undertaken in late 1943 and was accomplished without difficulty. Thus, as the MS 406s came in for major overhauls, they were re-engined. The first few conversions used the German 20-mm MG 151 cannon firing through the propeller shaft but, after centre-of-gravity problems, the Soviet Beresin 12·7-mm heavy machine-gun was used—with both the M-105P engines and the Beresin guns coming from captured stocks. It was planned to convert all existing Finnish MS 406s, the modified version being known as the "Mörkö-Moranni", with altered serials, e.g. MSv-637, but only about 15 were completed by the Finnish State Aircraft Factory by mid-1944. The Mörkö-Morannis were used to equip one flight of HLeLv 28.

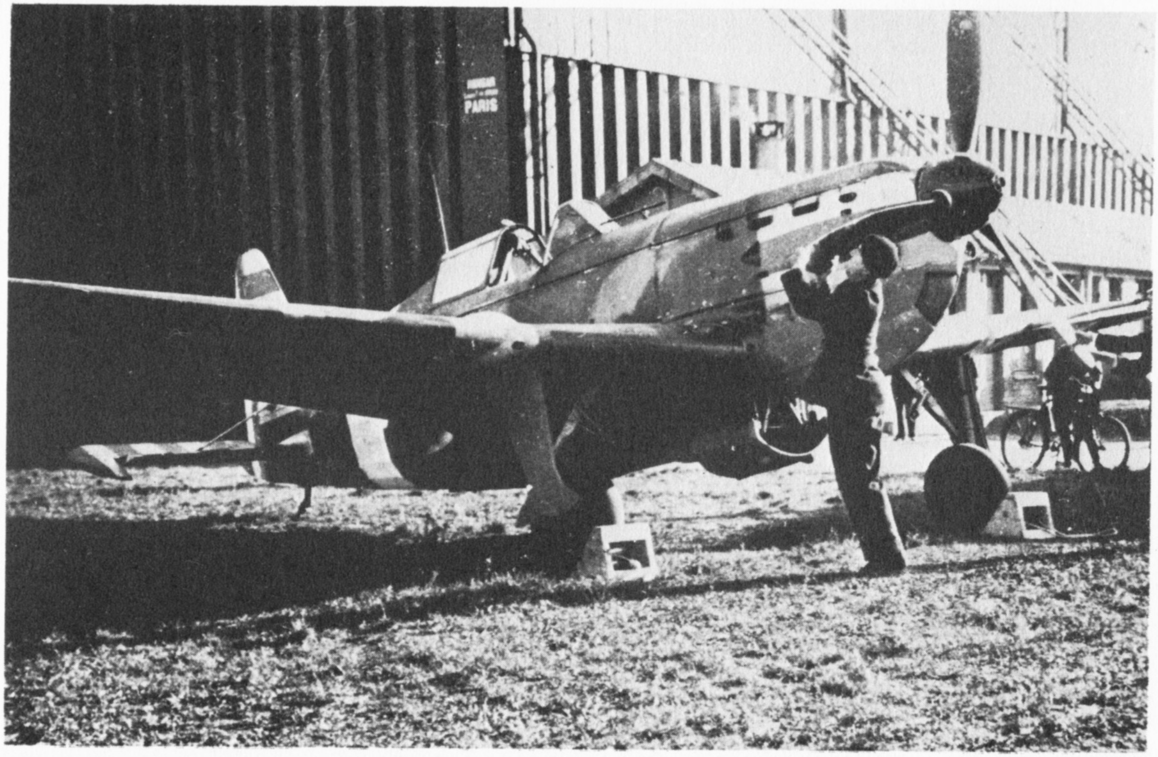
When Russo-Finnish fighting ceased under the

Armistice terms of September 1944, the MS 406s and Mörkö-Morannis had scored 121 victories in the Continuation War. Flight Master Urho "Jatti" Lehtovaara, the fourth ranking Finnish ace scored 14 of his 44 victories while flying Moranes.

The MS 406 and its re-engined derivative were among the types used against the Germans in the lack-lustre fighting undertaken by the Finns against their former allies, under the terms of the peace treaty with the USSR. There do not seem to have been any spectacular feats during this period. After the end of World War 2, the standard MS 406s were soon withdrawn from service, but the Mörkö-Moranni served with HLeLv 25 (which was HLeLv 28 renumbered during reorganisation) until 1952.

Twenty MS 406s were taken out of storage at Châteauroux in the Autumn of 1942 and delivered to Bulgaria. Details of their service in that country are not known to the author.

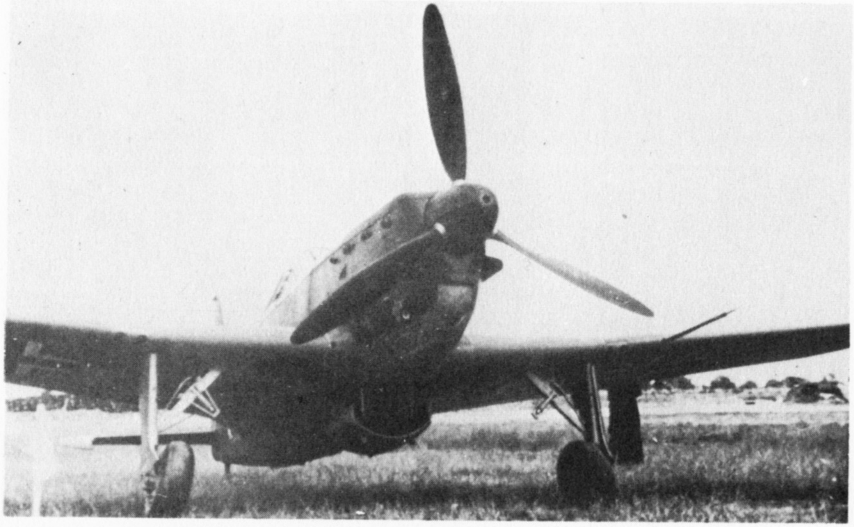
Finally, the story of the Morane in Switzerland. The Swiss authorities realised that the Government Aircraft Factory would be unable to

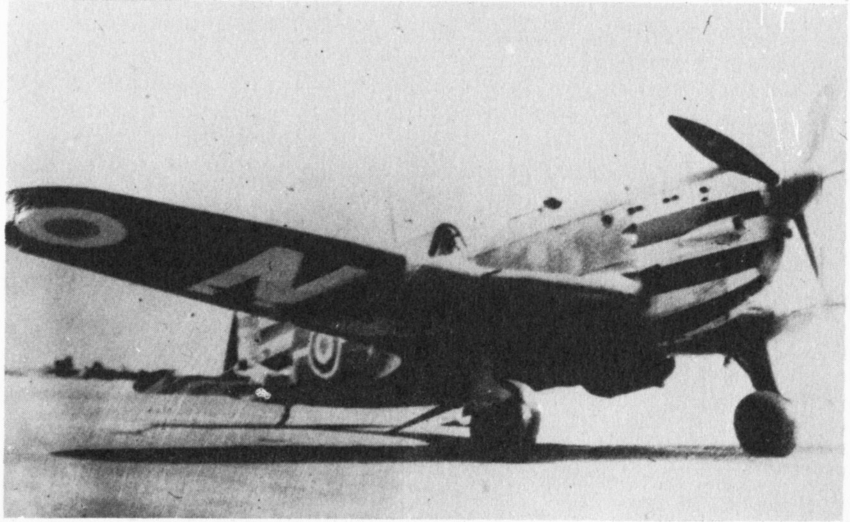


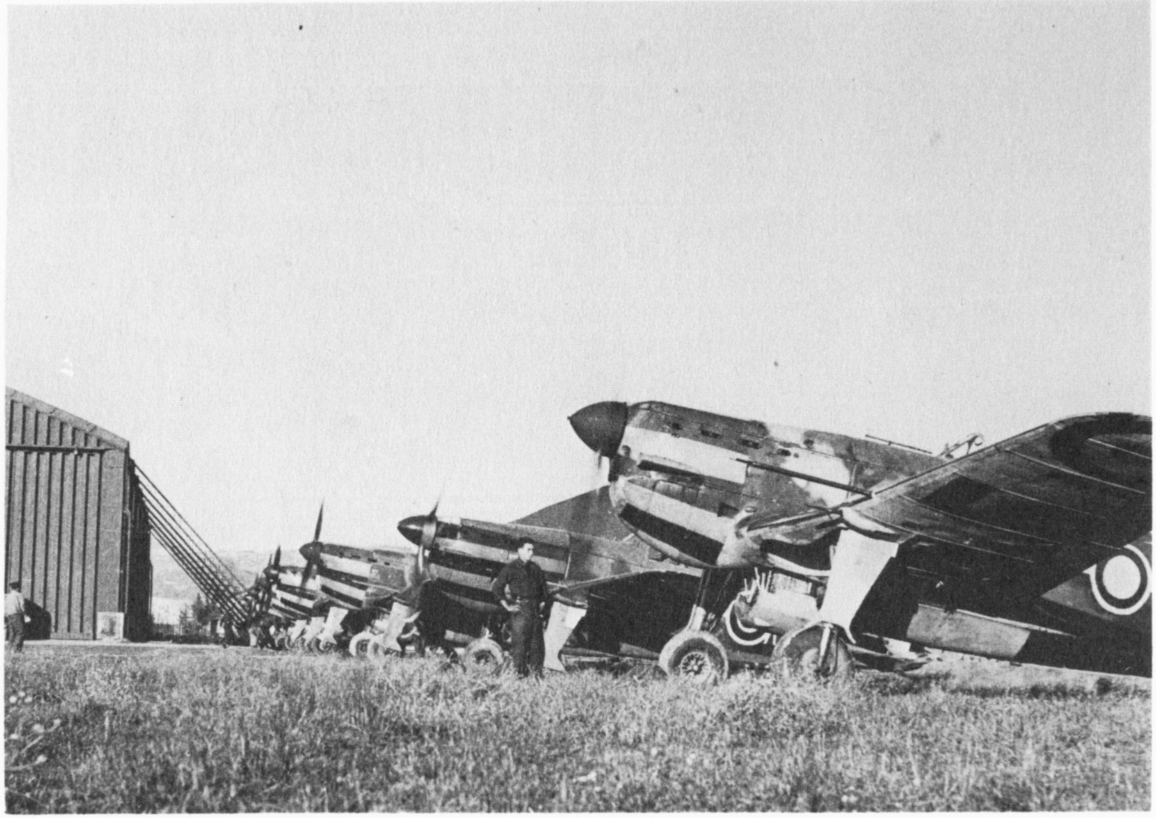
Above: *Most surviving Moranes were relegated to training duties by the Armistice Air Force; this particular specimen carries white wing and fuselage bands in addition to the usual red and yellow stripes* (Archives Botquin)

Below left: *After the Armistice, the Germans had a number of MS 406s reconditioned for delivery to their allies, notably Finland. This aircraft is at Bourges in 1941 and the German cross can be seen at the left outboard of the starboard main undercarriage leg* (Archives Botquin)

Below right: *An Armistice Air Force MS 406 fitted with underwing auxiliary fuel tanks* (Archives Botquin)







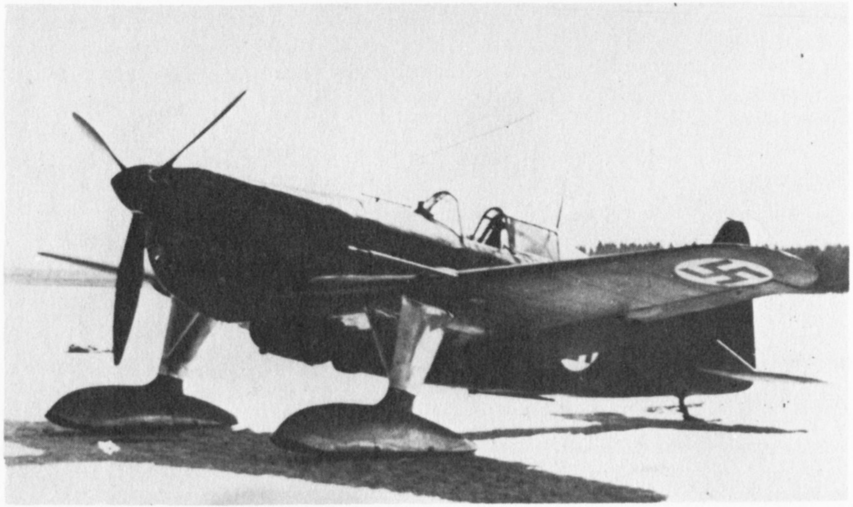
These MS 406 trainers at Aulnat in 1942 show variations in the application of the nose striping and matricules militaires, while the aircraft in the foreground has part of its main undercarriage fairings removed (ECPA)

develop a new single-seat fighter at the end of the 1930s because of its pre-occupation with the C-35 and C-36 reconnaissance aircraft. Therefore, it was decided that a foreign design should be built under licence, but the only type for which rights could be secured was the MS 405, which had been tested by Swiss pilots in late 1937. Under the licence agreement, two pattern aircraft were to be purchased from France.

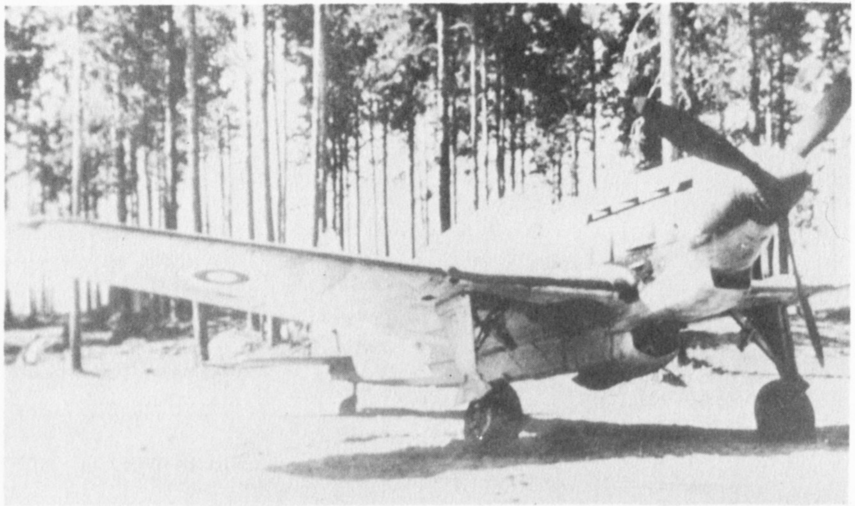
A certain amount of confusion surrounds these two aircraft. It has been said that the MS 405 Nos. 12 and 13 were supplied to Switzerland by Morane-Saulnier, but this is not the case. The two pattern aircraft in question were designated MS 406H (Helvétique-Swiss) owing to the changes made to satisfy the Swiss specification.

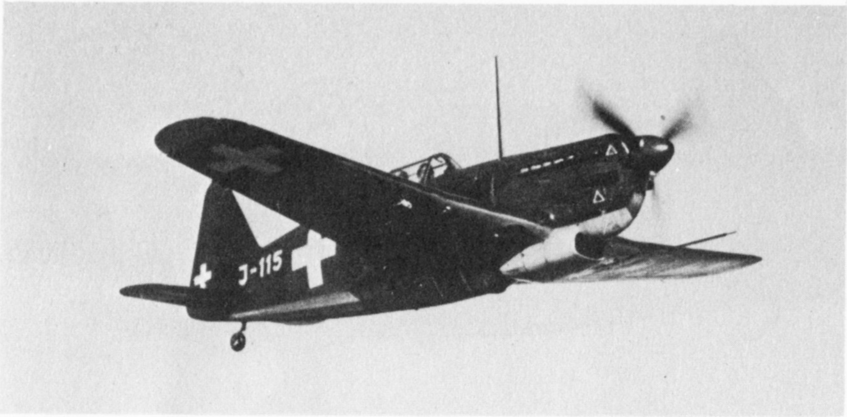
The two aircraft were delivered in September 1938 and April 1939 and received the Swiss serials J-1 and J-2. The first Swiss licence-built version was the D-3800, powered by the licence-built Hispano-Suiza 12Y 31, and the initial production aircraft were very similar to the MS 406 on delivery. A total of 80 of the first Swiss version was built, these being designated D-3800 and receiving the serials J-3 to J-82.

One of the first batch of MS 406s delivered to Finland (MS-311) was fitted with skis (Archives Botquin)

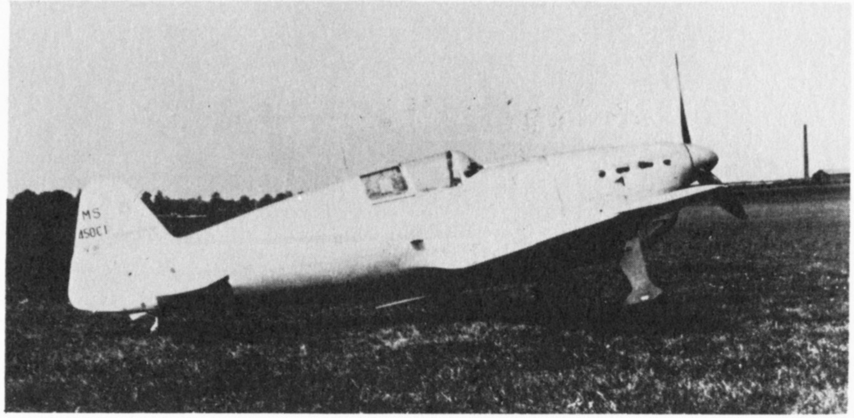


A 'Morko-Moranni' fitted with a captured M-105P engine, seen in post-Armistice Finnish markings (Archives Botquin)





The MS 406 was built under licence in Switzerland as the D-3800 and the design was developed into the D-3801, seen here. The most notable external difference between the D-3800 and its successor was the fixed radiator of the latter, similar to that of the MS 410 (Abteilung der Militarflugplatze)



The MS 450 was an attempt by the Morane-Saulnier design office to develop a successor to the MS 406—the specification was eventually won by the D 520. Three prototypes were built, the first of these (seen here) beginning flight tests in April 1939 (Archives Botquin)

Although the first deliveries which started in November 1939, were similar to the MS 406, several changes were introduced as production progressed and ultimately all D-3800s were brought up to this standard. The main changes were the substitution of a tailwheel for the MS 406's skid, the replacement of the rather primitive French gunsight by a reflex system, and the elimination of the machine-gun housing bulges in the wings. In addition, improved radio sets were installed. The last of the production D-3800s was delivered to the Swiss Air Force on August 29, 1940, although two further aircraft of this type were assembled from spares in 1942 and given the serials J-83 and J-84.

The D-3800 entered service in 1940 with Fliegerkompagnien (Fl.Kp.) 3, 4, 5, 13, 14, 19 and 20, and the latter two units, based at Dübendorf, were brought into first-line use that year. After World War 2, the D-3800s were quickly withdrawn from active service and relegated to training duties, although they were not withdrawn from use finally until the mid-1950s. During their service, many were modified to a standard approaching that of the D-3801, for example, the installation of fixed radiators, new Escher-Wyss propellers in place of the original Chauvière type and, latterly, the installation of American VHF radio sets.

The D-3801 was a development of the MS 406 with a number of detail improvements, the most notable exterior difference being the use of a fixed radiator. This version was powered by the licence-built 1,020 hp Hispano-Suiza 12Y 51, known as the Saurer YS 1, and also embodied the refinements introduced on the D-3800. One hundred D-3801s were initially ordered, these being given the military serials J-101 to J-200 and delivered between December 28, 1940 and June 19, 1942. The first units to operate the version were Fl.Kp. 12, 18 and 3 and the D-3801 replaced its predecessor as a second batch entered service from September 1944. This totalled 97 aircraft (serials J-201 to J-297) and deliveries were not completed until July 27, 1948, by which time the first de Havilland Vampire jets were being delivered to the Swiss Air Force. Also, a further 10 D-3801s were assembled from spares during 1943–5 these being serialled J-91 to J-100. The D-3801 served in the Swiss Air Force until 1959. In its final years it was used as a ground-attack aircraft with reserve units, being modified to mount six 80-mm rockets beneath the wings.

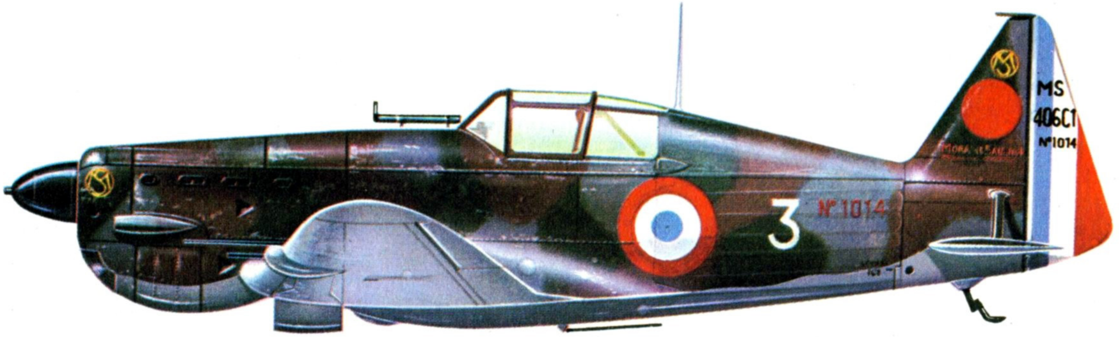
With the aid of drawings furnished by Morane-Saulnier in 1943 of a much-refined version of the MS 406, with the company designation MS 540, the Swiss Federal Aircraft factory developed the D-3802. This was a sleeker aircraft than either the D-3800 or the D-3801, and was powered by a 1,250 hp Saurer YS 2 inline engine. The first prototype made its first flight on September 29, 1944 and was similarly armed to its predecessors (one 20-mm cannon and wing-mounted machine-guns). A second prototype, designated D-3802A, was flown in early 1945 and featured two 20-mm cannon in the wings in addition to the engine-mounted cannon. An order for 100 D-3802As placed at this time was reduced to 10 after the war. These aircraft served with Fliegerstaffel 17 until 1956.

The Swiss developed one final variant of the series, the D-3803, which was powered by the 1,500 hp Saurer YS 3 engine; this was distinguished from the D-3802A by its all-round vision cockpit canopy and clipped wings. By the time the prototype flew in May 1947, jet aircraft were offering much superior performance and only the one aircraft was built, although it served with Fliegerstaffel 17 until the mid-1950s.

These Swiss Moranes were the last to remain in service and two D-3801s survive to this day. Very possibly they are the only ones of the MS 406 line still in existence.

Morane-Saulnier MS 406 Specification

Type: Single-seat fighter; low-wing metal and fabric monoplane with retractable main undercarriage.
Powerplant: One Hispano-Suiza 12Y 31 12-cylinder liquid-cooled Vee inline rated at 860 hp for take-off and at 13,120 ft.
Armament: One 20-mm Hispano-Suiza HS 9 or HS 404 cannon with 60 rounds firing through the propeller hub and two 7.5-mm MAC 1934 machine-guns with 300 rounds per gun in the wings.
Dimensions: Span, 34.81 ft; length, 26.80 ft; height, 10.67 ft; wing area, 172.2. sq ft.
Weights: Empty, 4,177 lb; normal loaded, 5,610 lb; maximum loaded, 6,000 lb.
Performance: Maximum speed, 281 mph at 6,560 ft and 304 mph at 14,764 ft; climb to 6,560 ft, 2 min 32 sec; climb to 19,685 ft, 9 min 3 sec; service ceiling, 32,800ft; range, 683 ml at 200 mph at 13,120 ft.


MS
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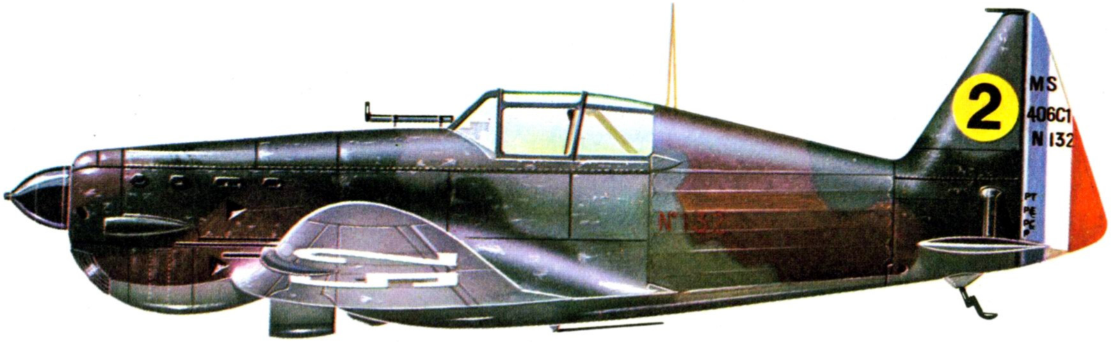
3

MS 406 No. 1014 of GC II/2, Laon, May 1940

MS 406 No. 132 of 6th Escadrille, GC III/7, France, end-1939, flown by Cdt. Maurice Arnoux (killed in action, 6 June 1940)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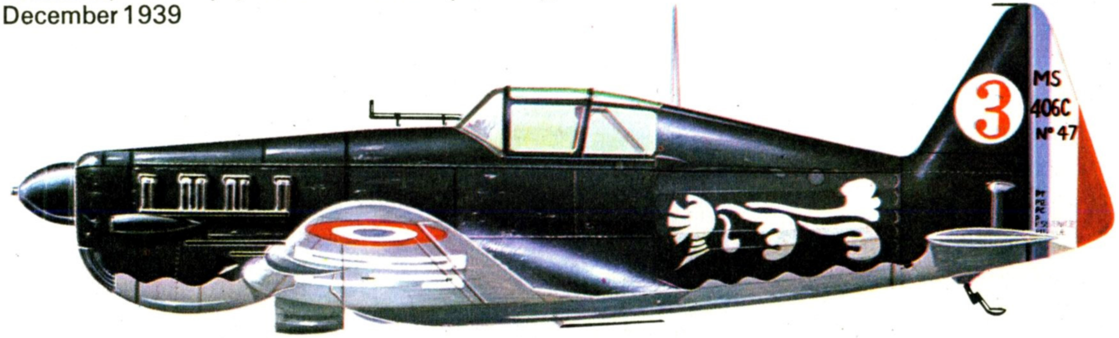
MS 406 No. 47 (matricule militaire N-358) of 1st Escadrille, GC I/7, Sidi Ahmed (Tunisia), December 1939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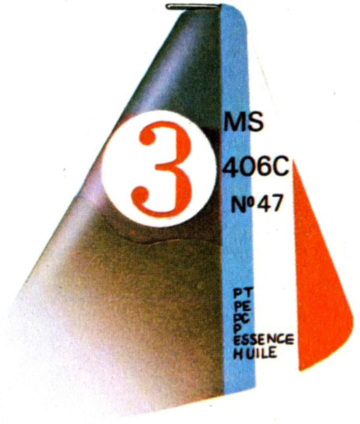
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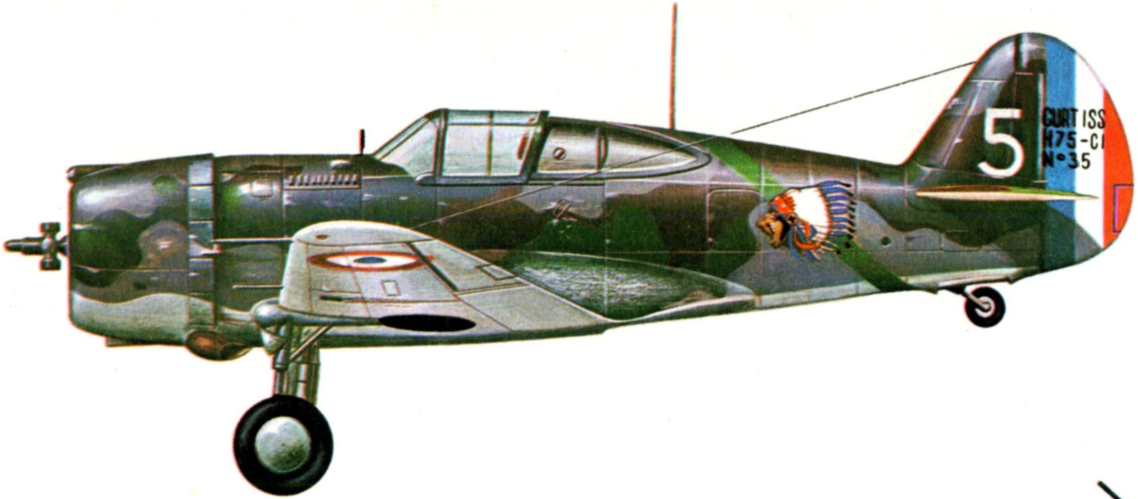
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H75-C1
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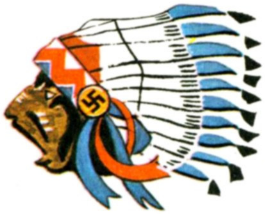
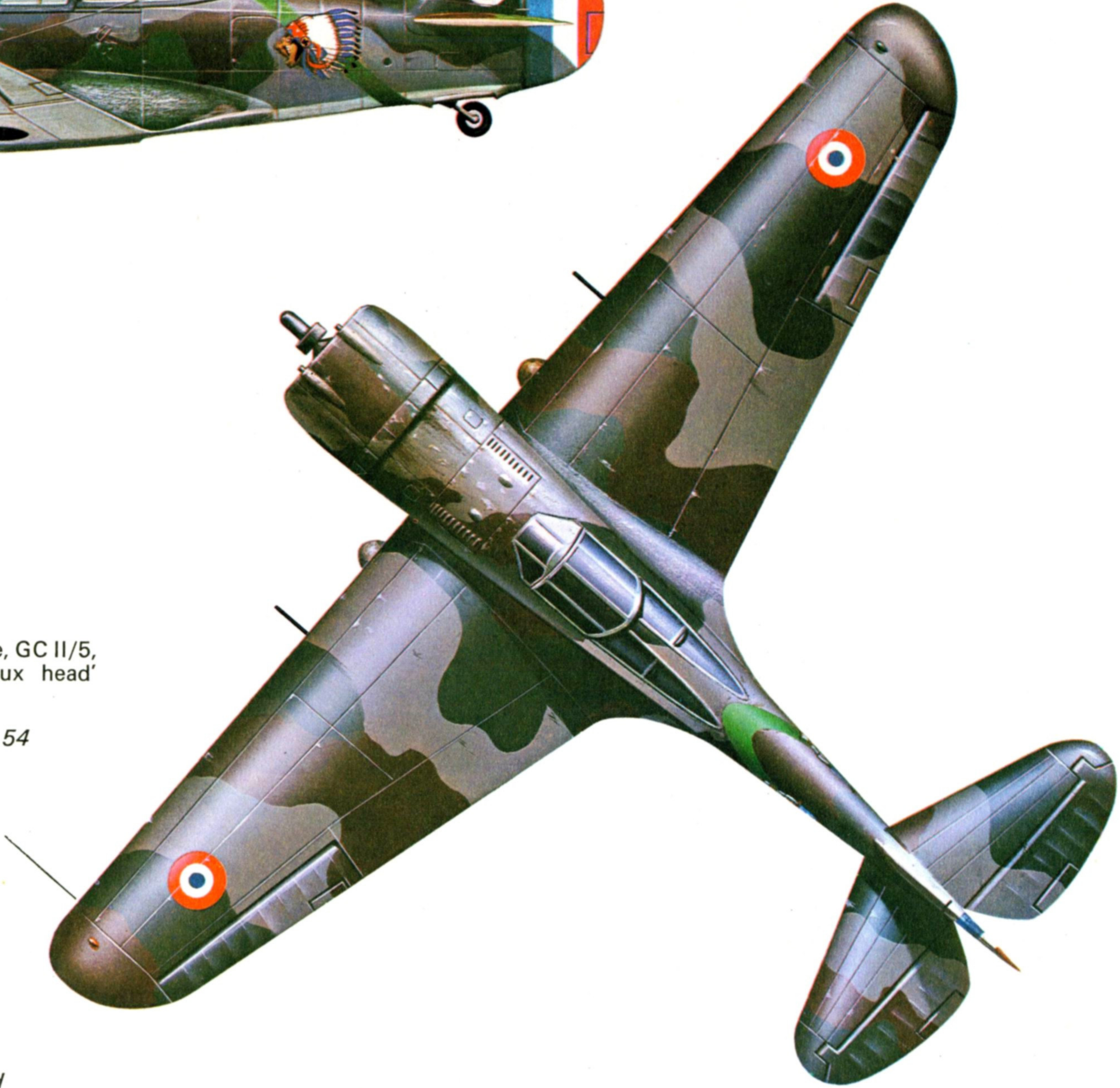
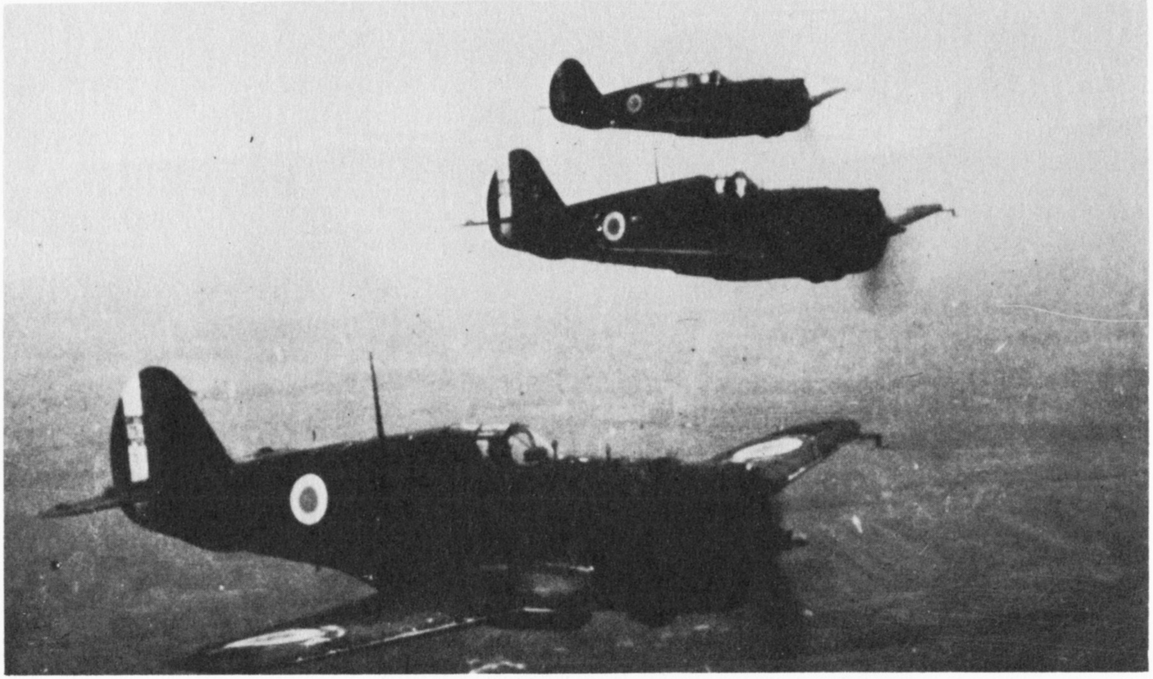




Curtiss H75A-1 No. 35 of 3rd Escadrille, GC II/5, France, December 1939. Note 'Sioux head' insignia

The remaining views will be found on p. 54

T. Brittain © Hylton Lacy Publishers Ltd



A 'patrouille simple' of Hawk 75As seen during the Spring of 1940. The poor quality of the print makes it impossible to identify the unit
(ECPA)

Curtiss Hawk 75

The Curtiss Hawk 75 was remarkably successful in French service and equipped five Groupes de Chasse during the German invasion of France. The type showed itself to be robust and a good firing platform and Hawk 75 pilots were officially credited with 230 confirmed and 81 probable victories between the outbreak of World War 2 and June 24, 1940. Several of the leading scorers in the French Air Force flew this type in combat.

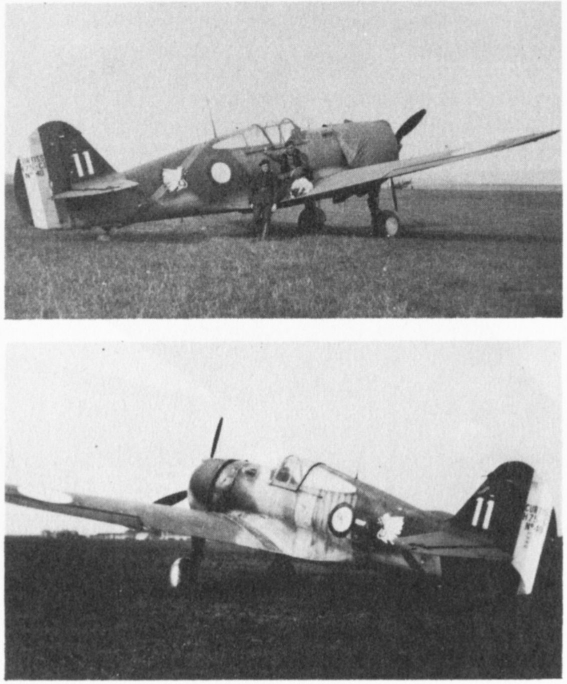
The Hawk 75 story began in 1934, when it was designed as a successor, in the United States Army Air Corps, to the Boeing P-26. The actual design competition was won by the Seversky P-35. However, the Curtiss design was ordered into quantity production in July 1937.

In parallel with work on the USAAC P-36, Curtiss developed several export variants and attracted a number of overseas orders. French interest stemmed from a realisation that the domestic Industry would be incapable of meeting the country's immediate needs for modern military aircraft unaided. Britain, like France, was in the throes of a large expansion of its Air Force and made it clear that it was having difficulty in meeting all its own requirements for aircraft. Hence Britain could not help. Both France and Britain were forced to turn to the United States for assistance.

In its search for fighters, the French Air Ministry studied both the Seversky P-35 and Curtiss P-36. The choice fell on the latter, which was felt, quite correctly, to have more potential. The choice of importing American aircraft for the French Air Force was bitterly resented by the Industry but, in May 1938, Contract 1035/8 was placed by the French Purchasing Mission in the USA for 100 Curtiss Hawk 75A-1 (or H75A-1) fighters. The official French military designation for the type was H75-C1 and this batch had the production numbers 1–100 and matricules militaires X-800 to X-899.

The Curtiss H75A-1 was basically similar to the USAAC's P-36A, but powered by the 1,050 hp Pratt & Whitney R-1830-SC3-G Twin Wasp radial and fitted with an armament of four 7·5-mm FN-Browning machine-guns, with two in the upper engine cowling and one in each wing. Certain French-specified equipment was fitted. For example, the instruments were metric-calibrated (some altimeters were calibrated in feet, however) and the throttle worked in the reverse sense to that customary on American and British aircraft. The first 16 Hawk 75s were shipped to France in an essentially complete condition, but subsequent examples were sent to France as major sections and assembled by the SNCA du Centre at Bourges. The first two Hawk 75s arrived in France in December 1938 and, after checking at Bourges, successfully underwent service trials. By March 1939, sufficient aircraft were available to introduce the H75A to squadron service and, by September 1939, four Groupes de Chasse were equipped.

Further orders were placed for the Hawk 75A during 1939 and a second assembly line was set up for the type, at Toulouse. The first follow-on order, Contract 1544/9, called for 100 H75A-2s—



Two views of H75A-1 No. 40 serving with GC II/5, 3rd Escadrille (known as the 'Escadrille Lafayette'), in the Spring of 1940. The Indian head was superimposed on a green diagonal band
(Camouflage Air Club)

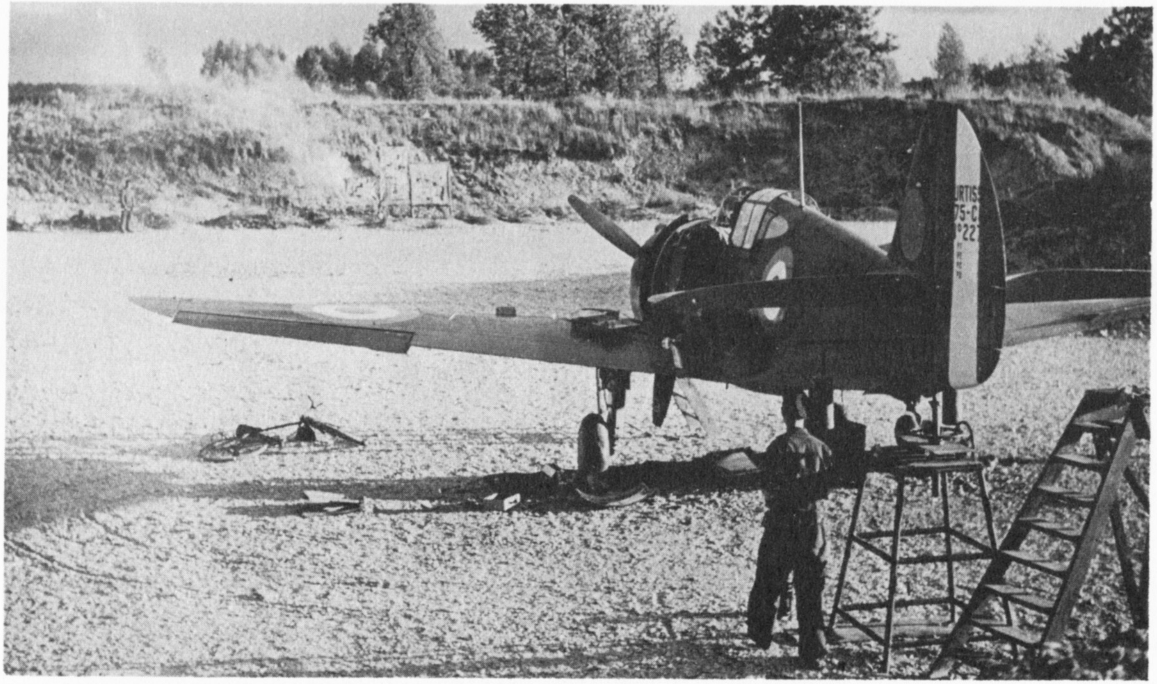
these were intended to be similar to the H75A-1 apart from the installation of a Pratt & Whitney R-1830-SC3G engine, the fitting of an additional 7.5mm machine-gun in each wing, and some reinforcing of the rear fuselage. In the event, the H75A-2s initially delivered did not have the new engine or extra guns: only the 41st and subsequent aircraft were fully up to standard. The H75A-2s were given production numbers 101–200 and the matricules militaires U-001 to U-100.

The third, and final, order for the Hawk 75A was Contract 173/0 of October 9, 1939. It envisaged the procurement of 530 aircraft, of which 135 were to be H75A-3s and 395 H75A-4s. Almost immediately is was altered to cover 20 additional H75A-4s and 100 H81s (this designation applying to the export version of the P-40). Contract 173/0 was altered yet again in February 1940 to cover 135 H75A-3s, 285 H75A-4s and 230 H81s. The H75A-3 was powered by the 1,200 h.p. Pratt & Whitney R-1830-S1C3-G Twin Wasp radial and fitted with an armament of six 7.5-mm machine-guns, two in the upper engine cowling and four in the wings. The A-3 version was allocated the production numbers 201–335 but matricules militaires were dropped by this time and not allocated. The H75A-4 was similarly armed to the A-3 but had a new engine, the 1,200 h.p. Wright R-1820-G205A Cyclone. This variant was designated H751/C1 by the French and production numbers began at No. 1, rather than No. 336.

All 200 Hawk 75A-1s and A-2s were delivered, except for a few lost at sea by enemy action in the course of delivery, while most of the A-3s and six A-4s reached France before the Armistice. No Curtiss H81As were delivered to France; the first production examples not being completed until September 1940 and subsequently going to the Royal Air Force. Some 316 Hawk 75s were officially taken on charge by the French Air Force, although others were in France, either assembled or still in crates awaiting assembly. A further 23 H75A-4s were en route for France at the time of the Armistice and they were landed in the West Indies. Later, following the Allied conquest of North Africa they were sent to Morocco and used for training.

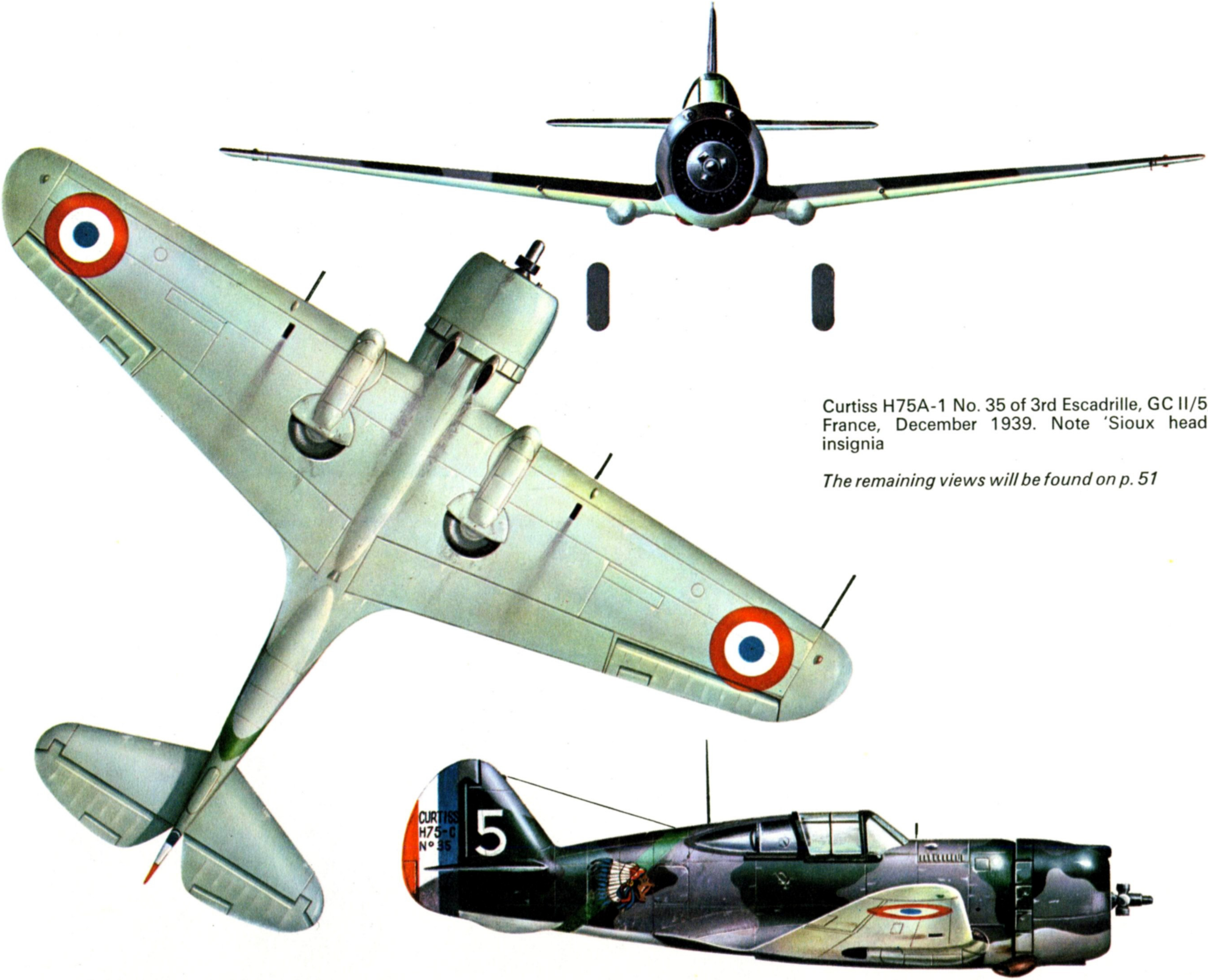
Henceforward, all outstanding French orders for the Hawk 75 were transferred to Britain after the Armistice (as was the case with other American aircraft including the Grumman G-36A—Royal Navy Martlet—on order for the Aéronavale) and the Royal Air Force received 227 originally intended for France. The bulk of these were H75A-3s and A-4s, known as the Mohawk III and IV respectively by the RAF, although a small number of A-1s and A-2s (designated Mohawk I and II respectively) were also taken on charge. While most of those shipped directly to Britain from the USA were "anglicised" to some extent, some accidents were caused with aircraft which retained their French-style "reverse-acting" throttles. The bulk of the RAF's Mohawks were sent to India, but some were delivered to the Portuguese and South African Air Forces.

The Germans captured a number of Hawk 75s in France, including some still in their crates. Some were used by the Luftwaffe for training, while others were overhauled in Germany and sold to Finland. The first Finnish batch comprised 21 H75A-3s (and eight H75A-6s originally ordered by Norway) and these were delivered during 1941. The ex-Norwegian aircraft were



Above: *H75A-3 No. 227, with its tail raised, in the firing butts for 'harmonisation' of its six 7·5 mm machine-guns* (ECPA)

Below: *The leading French 'ace' of 1939-40 was Edmond Marin la Meslée. The insignia of GC I/5, 1st Escadrille, can be seen below the cockpit* (ECPA)



Curtiss H75A-1 No. 35 of 3rd Escadrille, GC II/5, France, December 1939. Note 'Sioux head' insignia

The remaining views will be found on p. 51

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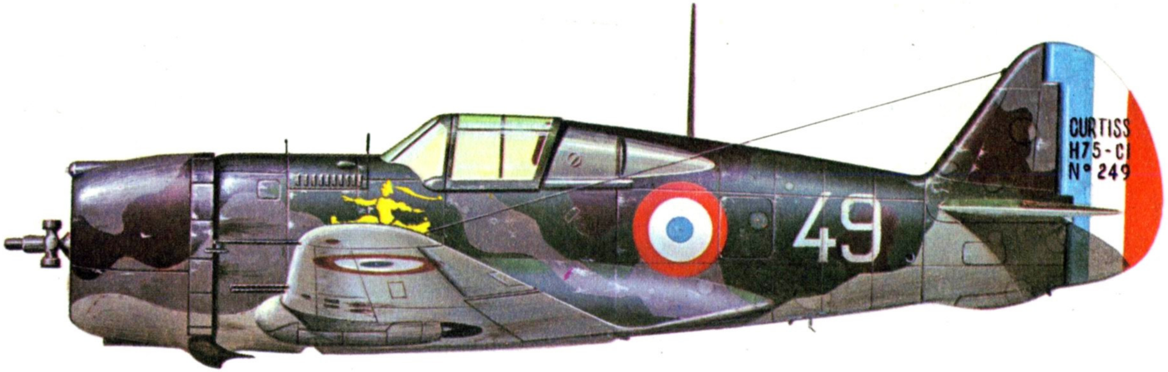
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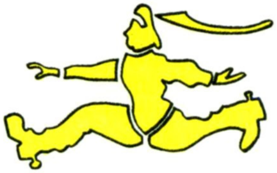
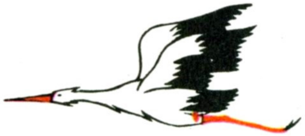
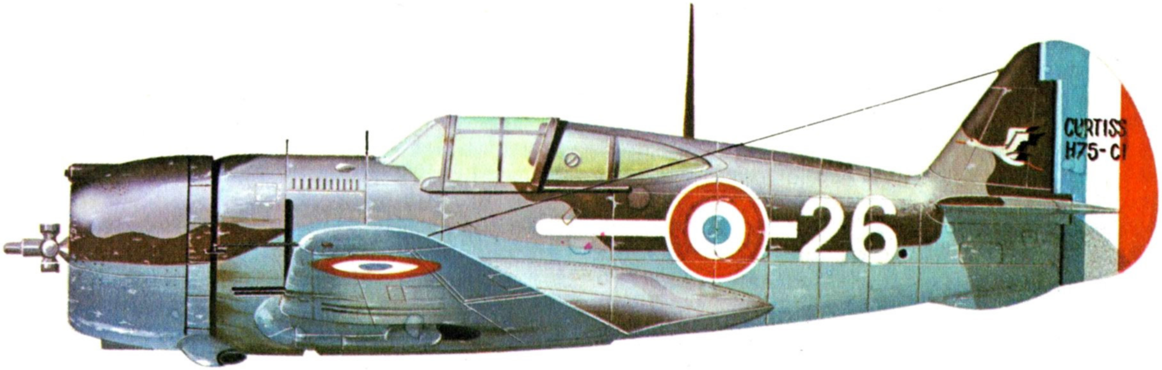


H75A-3 No. 249 of 4th Escadrille, GC II/4, France, June 1940



H75A-3 (No. unknown) of 4th Escadrille, GC II/5, Casablanca (Morocco), Summer 1941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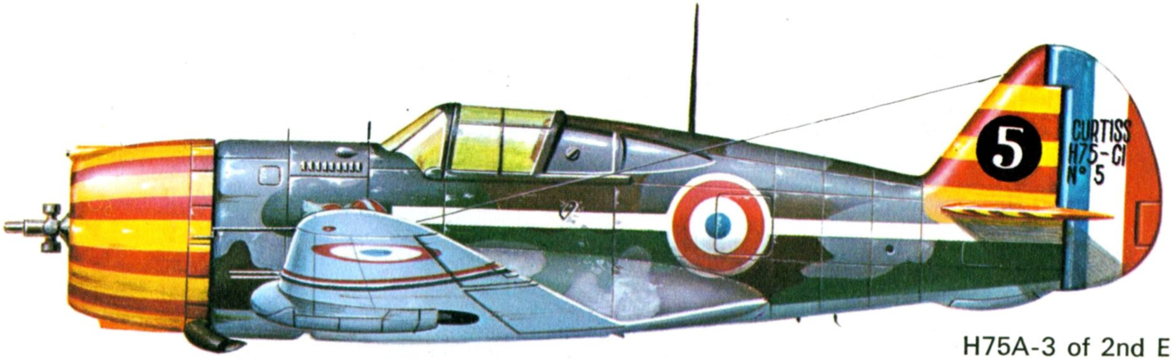
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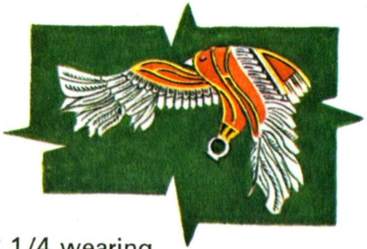

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H75A-3 of 2nd Escadrille, GC 1/4 wearing the Vichy neutrality colours of the French Air Force in 1942 originally issued to TLeLv 14 reconnaissance squadron but, in August 1941, all Finnish Hawk 75s were grouped in HLeLv 32 fighter squadron. This latter unit took part in heavy fighting during the summer of 1942. Early in 1943, the Germans supplied a further 12 ex-French aircraft to make good attrition, followed by three more in 1944. The Curtiss Hawk 75 performed well in Finnish service and was very popular with its pilots. The leading scorers while flying the Hawk 75 in Finland were Flight Master Eino Koskinen (11 victories); Lieutenant Kossi Karhila (10); and Lieutenant Jaako Hillo (9). In December 1944 HLeLv 32 was disbanded after the Russian defeat of the Finns and the Hawk 75s went to TLeLv 16 reconnaissance squadron, finally being withdrawn from service in 1948.

* * *

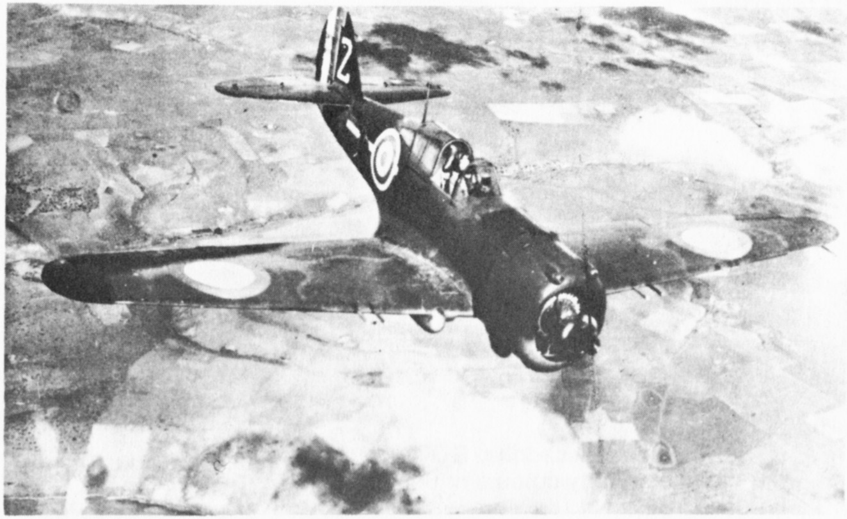
From the Spring of 1939, the H75A equipped four Groupes de Chasse. Of these, GC I/4, I/5 and II/5 had previously been operating the Dewoitine D 501, while GC II/4 was newly-created to operate the Hawk 75. At the outbreak of World War 2, these four units were declared operational, with GC I/4 and I/5 becoming part of Groupement 23 and GC II/4 and II/5 as part of Groupement 22. While the Germans were crushing Poland, the French launched a "limited" offensive in the Saar region and, on September 8, 1939, Curtiss Hawk 75s of GC II/4 shot down the first Messerschmitt Bf 109s of the war; these also being the French Air Force's first victories. The H75As took a major share in the 27 confirmed victories recorded over France during the first September of the war and laid the foundation for its good reputation.

Activity died down in the ensuing months and during the hard Winter of 1939–40 French fighter action was limited chiefly to the interception of high-flying Luftwaffe reconnaissance aircraft, mostly two-motor Dornier Do 17s. At altitude, the H75A was hardly much faster than the lightly-loaded Dorniers and, in common with other French fighters of the time, there was considerable trouble with the armament freezing-up. With the coming of Spring, German reconnaissance activity increased and the Curtiss' scores continued to mount.

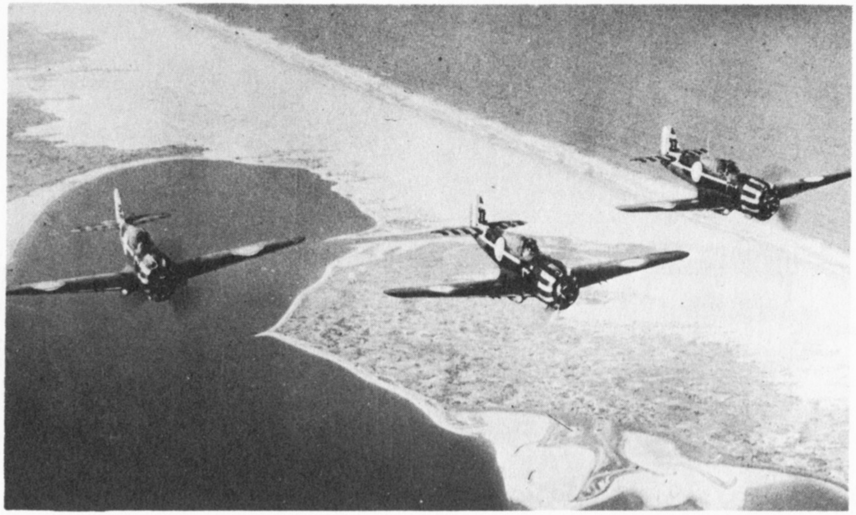
The German invasion of the Low Countries, on May 10, 1940, found the same four Groupes de Chasse equipped with the H75A and, in addition to their interception duties, they were also called upon to provide support for the ground forces. Thus, GC I/4 was detailed to the 7th Army and operated over Belgium and the Netherlands, while GC I/5 covered the 2nd Army in the Ardennes and GC II/4 and II/5 were assigned to provide aerial defence for the 2nd and 3rd Armies. With the German breakthrough at Sedan, the Curtiss units found themselves covering the pivot of the French ground forces near the Belgian border and, although they were still operating from their original bases of May 10 (Wez-Thisy, Suippes, Toul and Xaffevillers), detachments were often based on forward airfields to undertake close-support duties. As a result of the fighting, the Curtiss pilots were building up creditable scores, one notable example being Sergent-Chef Morel of GC I/5 who scored 10 confirmed victories between May 10 and May 18 which was the day of his death.

France's situation was becoming desperate as May drew to a close and the Hawk 75A units were re-deployed, except for GC II/5 which remained at Toul, when a new line of defence was drawn-up. A fifth unit was equipped with the Curtiss Hawk 75A late in May, this being GC III/2 which had previously been equipped with the MS 406 but had lost a large number to Luftwaffe ground-attack raids. GC III/2 became operational on the Hawk 75 on June 7; in common with the three re-deployed units it was initially based along the Seine and in the Paris region to defend the heavy industry located there. The German breakthrough on the Somme on June 10 resulted in the retreat towards the south and the Hawk 75 also received a new task, that of visual reconnaissance to assist Army units that could not be given photo-reconnaissance support.

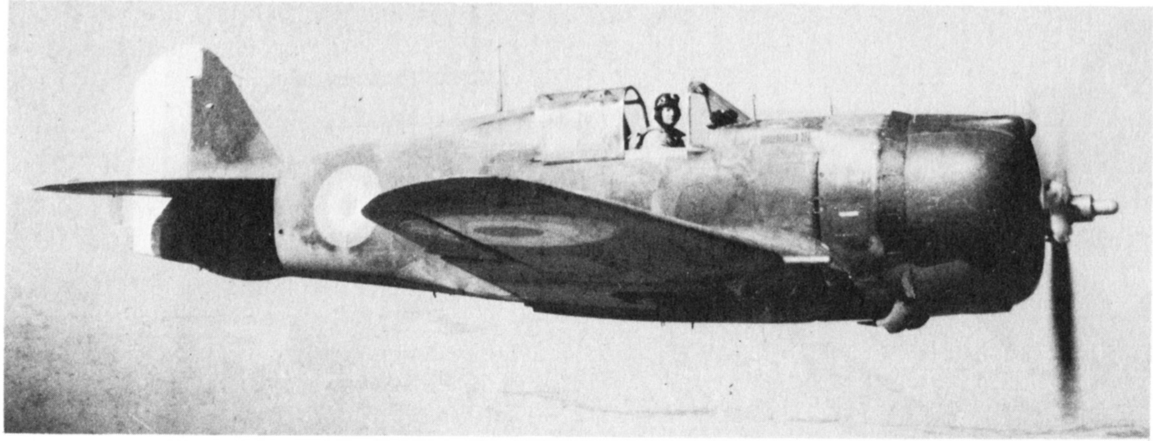
The efficiency of the French Air Force units diminished rapidly with the southwards retreat and from June 18, the Curtiss units began to leave



An H75A-3 of GC I/5, 2nd Escadrille, not long after the Armistice; note the abbreviated fuselage band forward of the roundel (ECPA)



A formation of Hawk 75As of GC I/4, 2nd Escadrille, based in Senegal during 1941-42 (ECPA)



Above: *After the Allied invasion of North Africa, the H75A was used for training, as evidenced by this Hawk 75A of a Centre d'Instruction de Chasse* (ECPA)

Below: *A line-up of aircraft of GC II/5 at Casablanca, Morocco, during 1941. The upper surfaces of these Hawk 75As were painted grey and dark Sienna Earth* (ECPA)

Metropolitan France for North Africa. GC III/2 and I/4 left on June 18, GC II/4 on the next day and GC I/5 and II/5 the day after. As noted earlier, Hawk 75 pilots were credited with 311 confirmed and probable victories up to the Armistice and one Curtiss pilot, Lieutenant Edmond Marin la Meslée, was the doyen of French pilots in 1939–40. He was credited with 16 confirmed and four probable victories while serving with GC I/5. He died in action over Alsace on February 4, 1945 while leading GC I/5, then equipped with P-47 Thunderbolts, without increasing his score.

Although the Hawk 75 units were grounded in North Africa after the Armistice, they were soon in action again as a result of the British attack on the naval base of Mers-el-Kebir in July 1940. GC II/5 recorded two confirmed and two probable Blackburn Skua dive-bombers on July 3 and 6 when Fleet Air Arm aircraft attacked the base. Two units, GC III/2 and II/4, were disbanded in July 1940, but the three others operating the H75A remained in being. GC I/4 was sent to Dakar, Senegal, while GC I/5 was based at Rabat, Morocco, and GC II/5 at Casablanca, Morocco. Some aircraft from GC II/5 were sent to Dakar to re-inforce GC I/4 during the Winter of 1940–1, making the flight across the Sahara in both directions without trouble.

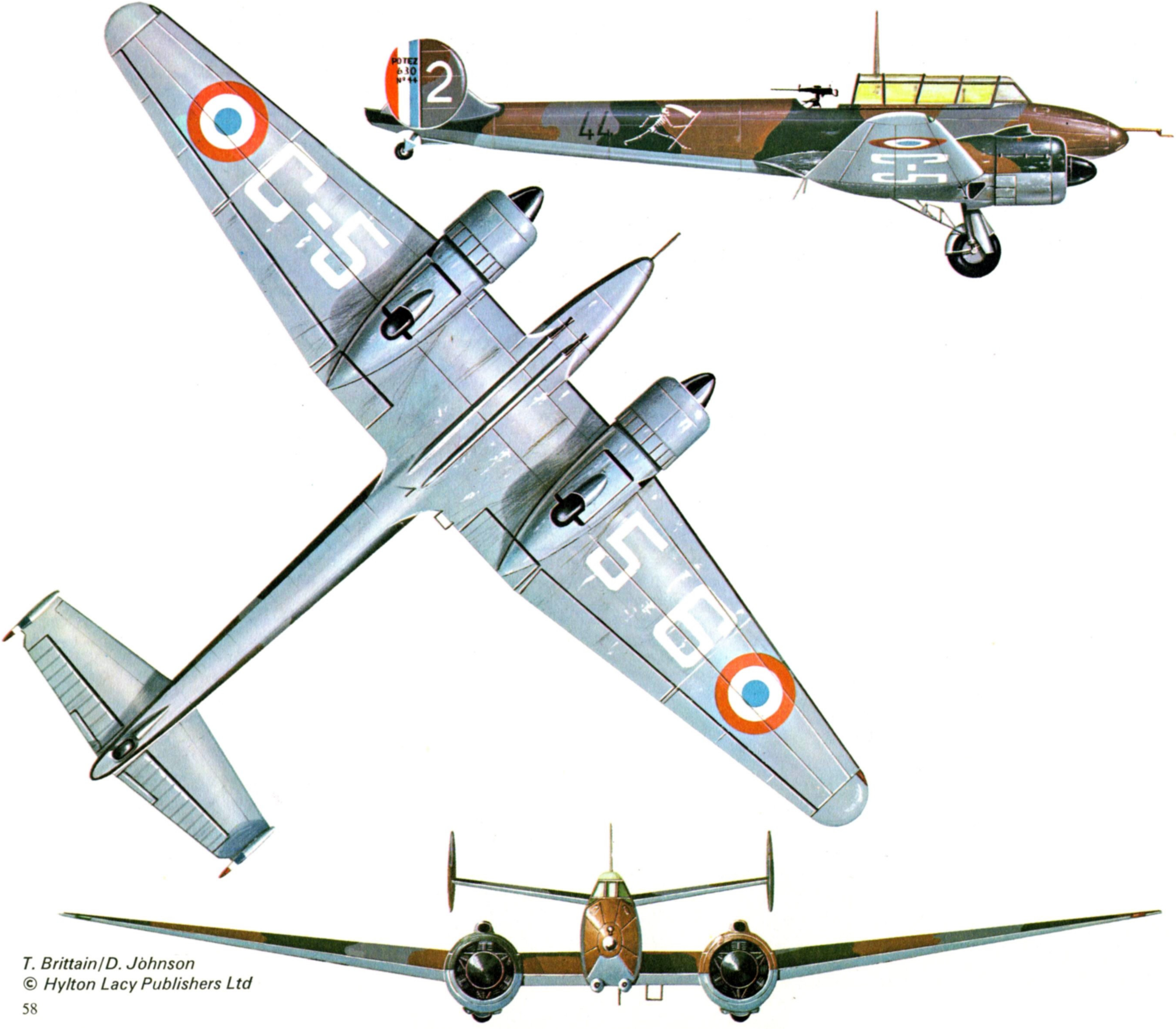
There was little action for these units before the Allied invasion of North Africa, although a GC I/5 aircraft shot down an RAF Vickers-Armstrongs Wellington during 1941.

On November 8, 1942, when "Operation Torch" was launched, GC I/5 and II/5 found themselves opposing American forces. (The 1st Escadrille of GC II/5 was then re-equipping with the Dewoitine D 520 but they were not used in the fighting.) The Hawk 75 was used for interception, where it fared badly against the US Navy's Grumman F4F Wildcats (RN Martlet), and bomber escort duties, the latter chiefly against the Fedala sector. The French forces resisted grimly until November 11, by which time few H75As remained serviceable. Fifteen were shot down and others were destroyed on the ground. In turn, GC I/5 claimed only one victory but GC II/5 shot down seven Wildcats and one USN floatplane, possibly a Curtiss SOC Seagull.

With the Allied success in "Operation Torch" an established fact, the Hawk 75's career in French service came to an end. Its units were now on the Allied side and before the end of November 1942, GC II/5 began conversion to the Curtiss P-40. GC I/4 and I/5 converted to the Bell P-39 Airacobra during 1943, the former after a brief period flying the D 520. The surviving Hawk 75s were used as training and liaison aircraft, the majority going to the Ecole de Chasse successively based at Marrakesh and Meknes and being joined by some of the H75A-4s which had been dumped in the West Indies in June 1940. A few aircraft survived the war and struggled on a little longer, hampered by increasing spares problems, the last Hawk 75s being withdrawn from use in late 1949.

Curtiss H75A Specification

Type: Single-seat fighter; low-wing, all-metal monoplane with monocoque fuselage and fully-retractable undercarriage.
Powerplant: (H75A-1 and H75A-2) One 1,050 hp Pratt & Whitney R-1830-SC3-G Twin Wasp 14-cylinder air-cooled two-row radial. (H75A-3) One 1,200 hp Pratt & Whitney R-1830-S1C3-G (rated at 1,050 hp at 7, 500ft). (H75A-4) One 1,200 hp Wright GR-1820-G205A Cyclone 9-cylinder air-cooled radial.
Armament: (H75A-1) Four 7.5-mm FN-Browning machine-guns. (H75A-2 to H75A-4) Six 7.5-mm FN-Browning machine-guns.
Dimensions: (H75A-1 to H75A-3) Span 37.33 ft; length 28.50 ft; height, 9.50 ft; wing area, 236.0 sq ft. (H 75A-4) As for the earlier models, except length, 28. 63 ft.
Weights: (H75A-1) Normal loaded, 5,692 lb. (H75A-3) Empty, 4,620 lb; normal loaded, 5,734 lb; maximum take-off, 6,010 lb. (H75A-4) Empty, 4,541 lb; normal loaded, 5,750 lb; maximum take-off, 6,662 lb.
Performance: (H75A-1) Maximum speed, 303 mph at 19.000 ft; service ceiling, 32,800 ft; combat range, 677 ml. (H75A-3) Maximum speed, 311 mph at 10,000 ft; climb to 15,000 ft, 4 mih 55 sec; service ceiling, 32,800 ft; combat range, 820 ml. (H75A-4) Maximum speed, 323 mph at 15,100 ft; service ceiling, 32,800 ft; range, 603 ml at 248 mph.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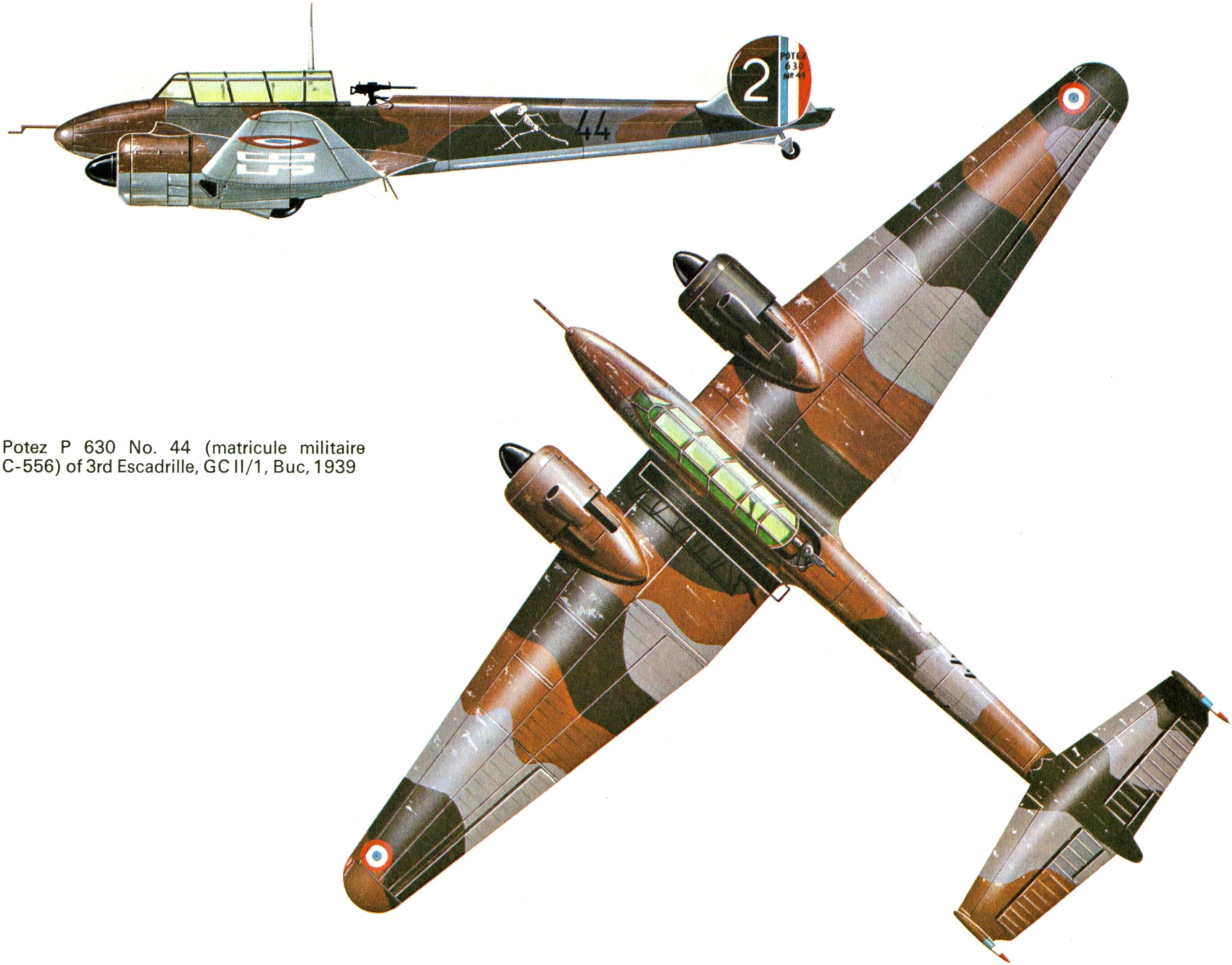
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Potez P 630 No. 44 (matricule militaire C-556) of 3rd Escadrille, GC II/1, Buc, 1939

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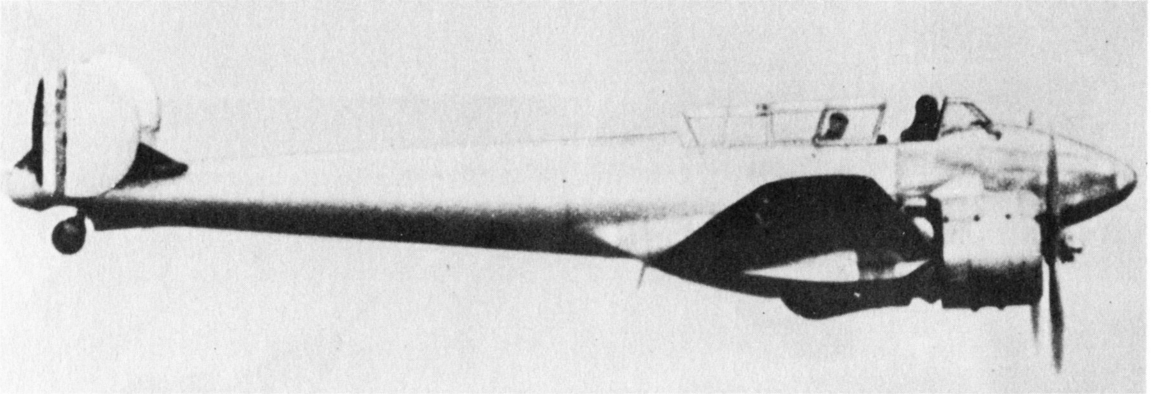
Potez 630 - 631

The Potez 63 series embraces fighter, light bomber, reconnaissance and army co-operation variants. This particular chapter deals only with the fighter versions (the others will be described in a later companion volume) and combat results showed that they were as unsuited to their task as the Messerschmitt Bf 110 proved to be in the Battle of Britain. Originally employed as strategic fighters and directors for single-seat interceptors, they were then tried out as night fighters. It is a tragedy that the detection of enemy aircraft at night was in its infancy in 1940, for otherwise they may have had success comparable to that of the Bf 110 just a few years later.

The parent of the series, the Potez 63, was designed to meet a Specification issued by the French Air Ministry in October 1934 for a two/three-seat multi-purpose fighter to be powered by two Hispano-Suiza 14 or Gnôme-Rhône 14 two-row radials, or comparable engines. The aircraft was required to fulfil three duties: fighter direction (the control of formations of single-seat fighters); attack and bomber escort; and night fighting—the first two being C3 (three-seat day fighter) suffixes and the third, CN2 (two-seat night fighter) tasks. The performance requirements were relatively stringent for the time and the aircraft had to carry an offensive armament of two 20-mm forward-firing cannon, plus a defensive armament of a rear-mounted flexible machine-gun.

Potez put forward a very elegant design in two versions, similar except for the powerplants, one powered by two Hispano-Suiza 14 radials (designated P 630) and the other powered by two Gnôme-Rhône 14 radials (the P 631). Among the other designs put forward to the Specification were the Breguet 690, Hanriot 220, Loire-Nieuport 20 and Romano 110. The Breguet 690 outgrew the original proposals and became an attack aircraft, while the Hanriot 220 was developed into the NC 600.

The first Potez prototype is generally referred to quite simply as the Potez 63, although, strictly speaking, it was the P 630-01. Here it will be referred to by the latter designation. Work on the P 630-01 began at Méaulte in April 1935 and the prototype made its first flight from there on April 25, 1936. Powered by two 580 hp Hispano-Suiza 14 Hbs radials, the P 630-01 was flown initially with a braced wooden tailplane because the optimum design of this sub-assembly had not yet been determined. Initial flight testing of the P 630-01 was quite eventful. For example, early in May 1936, the prototype shed a propeller blade and the port engine came out of its mounting, hanging beneath the wing. The pilot managed to jettison the dangling powerplant and land safely. After repairs and further flight testing, the P 630-01 was fitted with its definitive tail unit in August 1936 and was delivered to the CEMA, Villacoublay, in December of that year for official flight trials. Firing trials at Cazaux followed, and by the Spring of 1937 it was considered that the aircraft was fully developed.



Above top: *The first of the Potez 63 series, the P 630-01, which first flew in April 1936. In 1938, this aircraft became a civil mail carrier (as did the P 631-01) and it was handed back to the Air Force in 1940* (ECPA)

Above bottom: *The P 630 assembly line at Méaulte in late-1937 or early-1938. The type was later also assembled at Les Mureaux* (via the author)

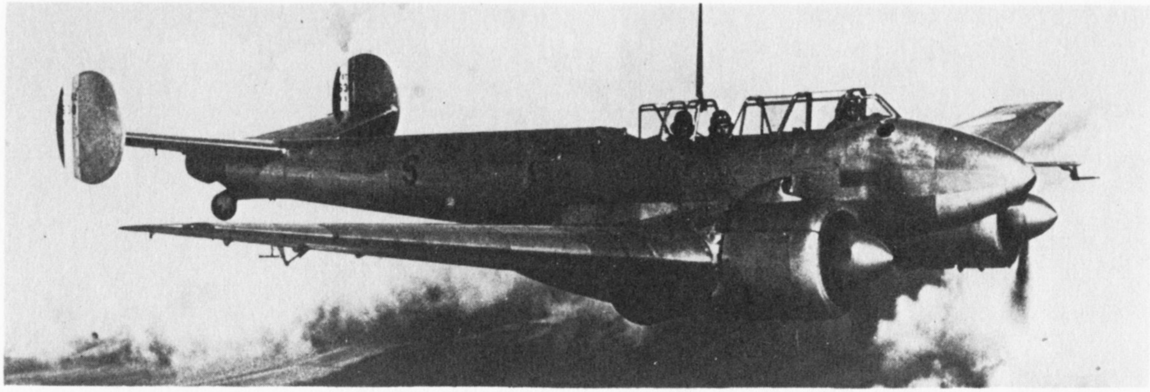
The original aero-engines had been successively replaced by Hispano-Suiza 14 AB02/03 and 14 AB 10/11 radials, the latter being rated at 700 hp for take-off and 725 hp at altitude.

The second prototype, the P 631-01, powered by two 575 hp Gnôme-Rhône 14 Mars radials, was first flown at Méaulte on March 15, 1937 and this aircraft, too, was damaged during initial flight trials when the undercarriage failed to lock in the "down" position and collapsed on landing. After repair, the P 631-01 was also sent to the CEMA, for official tests in November 1937.

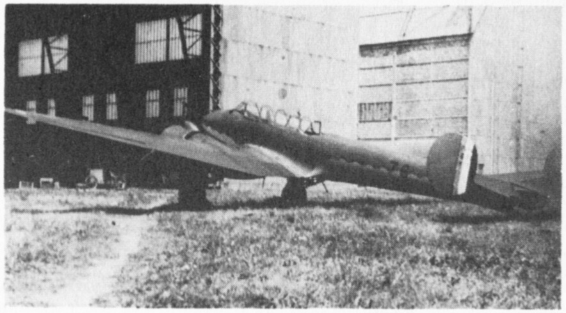
While the P 630 and 631 prototypes were under development, the Potez plant at Méaulte had become part of the Société Nationale de Constructions Aéronautiques du Nord (SNCAN). The Air Ministry gave the SNCAN a provisional order in May 1937 for 10 prototypes to be based on the P 630 design, including four Potez P 630s, three P 631s (including the P 631-01 prototype), two P 633 light bombers, and one P 637 reconnaissance version. This order, Contract 813/7, was confirmed on December 21, 1937, although one of the P 633s was replaced by a P 639 ground-attack variant.

From this point onwards, the non-fighter variants are ignored as they will appear in the later companion volume, but it should be noted that the P 630 and P 631 orders were slightly changed. Of the four P 630s, three were to be three-seat fighters (C3) and one to be a two-seat night fighter (CN2). Also, of the three P 631s, two were to be three-seat fighters and one to be a dual-control trainer (P 631 INS). The major external difference between the P 630 and P 631 was in the outline of the aero-engine cowlings—where the air intake for the P 630's carburettors were located on the upper part of the cowlings, and on the lower part of the cowlings for the P 631. In addition, the P 631's engine cowlings were of narrower cross-section.

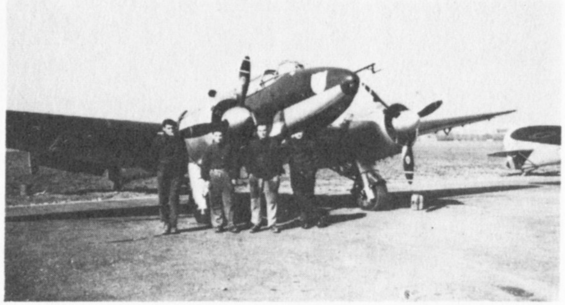
The SNCAN was informed of plans to order the Potez designs in quantity and began to make plans for this eventuality. Two further provisional Contracts were placed in May 1937 and confirmed in December of that year. Contract 1049/7 was for 80 P 630s (production numbers 3–82, the first 48 to have Hispano-Suiza 14 AB 02/03 engines and the remainder 14 AB 10/11s), and 30 P 631s (numbers 11–40). The second order, Contract 1582/7, called for 10 P 631 INS dual-control trainers (numbers 1–10) and 50 P 631 fighters (numbers 41–90). The first production P 630 first flew in February 1938 and the following May the first examples of the type were taken on charge by the French Air Force. The Air Force accepted the first P 631 in August 1938.



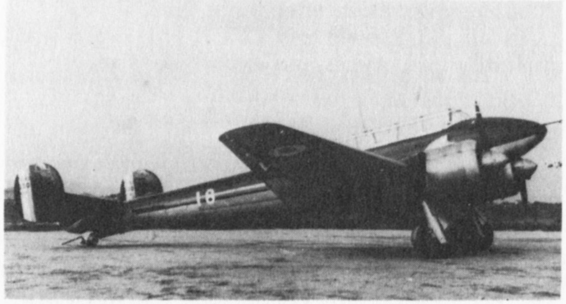
Above top: *One of the first P 630s to be handed over to the French Air Force, in the Spring of 1938, was No. 5. Production aircraft had the following matricules militaires: Nos. 1 and 2—C-512 and 513; Nos. 3-72—C-515 to 584; and Nos. 73-82—X-700 to 709* (ECPA)



Above left: *P 630 No. 76 serving with the 5th Groupe de Chasse Autonome, based at Sidi Ahmed, Tunisia, in November 1939* (Camouflage Air Club)



Above right: *A fighter director P 630 seen with the 3rd Escadre de Chasse at Dijon shortly before the outbreak of the war. The unit insignia has not yet been painted on the shield on the nose* (C-J. Ehrengardt)

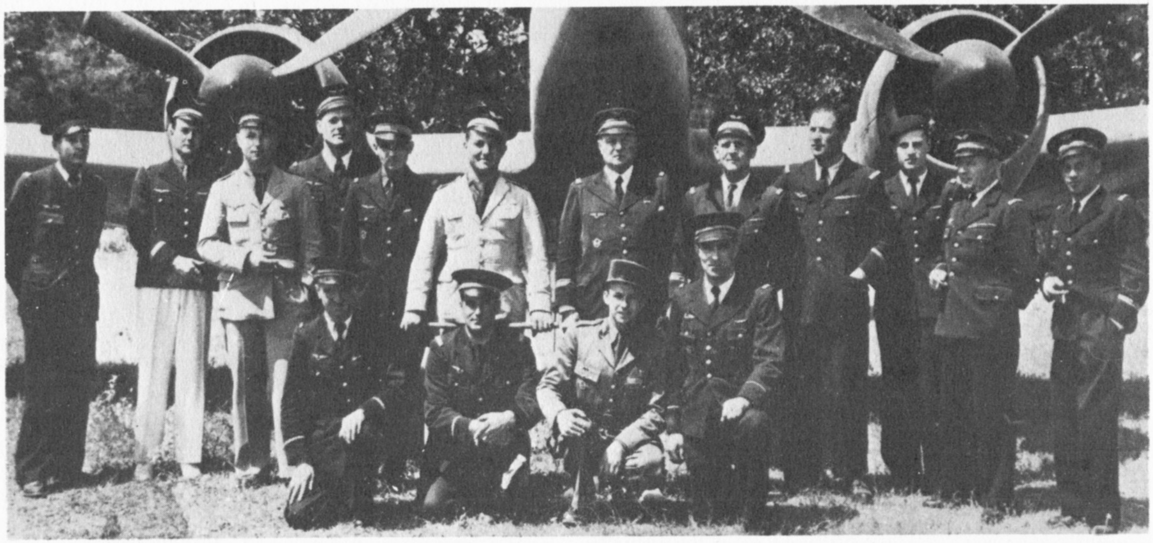


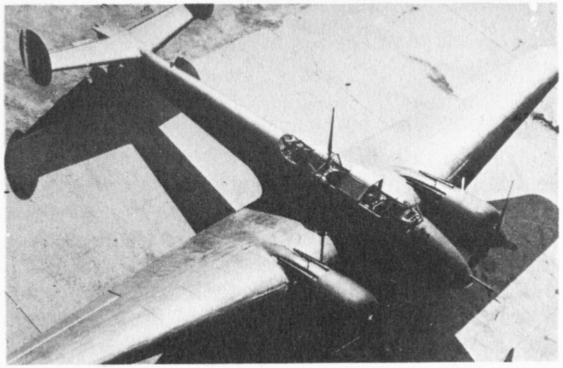
Below: *When P 630 No. 18 was at St Jean d'Angeley in June 1940, it carried an anomolous matricule militaire, X-500 instead of the allocated C-520* (Camouflage Air Club)

Meanwhile, the Air Force Plan V re-equipment scheme, which was to determine the material used in the Battle of France, had been approved and this envisaged further orders for the P 631 (which was preferred to the P .630) because nothing better was available. Progress with the 1936 twin-engine fighter Specification was slow, so Plan V, which called for 207 two-motor day and night fighters to be delivered by April 1939—121 with operational units—had to make do with the 1934 design.

It had never been intended to order large numbers of P 630s, the original 80 being contracted for simply because Gnôme-Rhône radial production output could not, initially, match airframe output. Thus, in the Summer of 1938, it was decided to withdraw them from first-line squadrons as soon as sufficient P 631s became available. The P 630s were gradually converted for dual-control instructional purposes over the next 18 months or so, and orders for the P 631 were brought up to a total of 207 aircraft. A March 1938 order for 65 P 633 bombers, Contract 299/8, was altered to 65 P 631s two months later, and 52 more were ordered to Contract 907/8 in June 1938.

There was considerable foreign interest in the Potez 63 series and, although the main orders were for the P 633 light bomber, a small number of fighters was ordered. The Avia company of Czechoslovakia acquired a licence to build the three-seat fighter variant, designated the Potez





Above: *In May 1940, Escadrille de Chasse Multiplace de Jour I/16 was based at Wez-Thuisy with its P 631s as part of Groupement de Chasse 23. The photograph shows members of ECMJ I/16 and one of the unit's aircraft* (Dr Rivière)

Left: *This excellent view of a P 631 shows details of the cockpit layout, and the engine cowlings. It is thought that this particular aircraft was painted semi-matt khaki, and it has small upper wing roundels* (ECPA)

636, but none was completed before the country was annexed by Germany. China ordered four P 631s but none arrived. The first two aircraft were actually en route by sea in August 1939 but were seized by the French colonial authorities in Indo-China when they reached the port of Haiphong, and the other two were taken on charge by the French Air Force in April 1940. Switzerland ordered one P 630 fighter and one P 633 light bomber, these being delivered in 1939. Yugoslavia ordered one P 630 and one P 631 for evaluation. The former was delivered in 1939, but the latter was written-off in a crash before delivery.

Two further fighter variants of the Potez 63 series deserve mention. The P 635 was proposed as a two-seat night fighter (CN2) version of the P 631 but was not built. One point of interest about this design was that it was planned to fit two 20-mm cannon aimed to fire forward and upwards at an angle of 20° in a way remniscent of the German "Schräge Musik" installation in the Messerschmitt Bf 110, for example. The Potez 63.12 C3 was built, this being P 631 No. 40 fitted with two 700 hp Pratt & Whitney R-1535 Twin Wasp Junior radials. The converted aircraft was first flown in this form at Méaulte on December 29, 1938 but was converted back to P 631 configuration after flight tests.

In all, 88 P 630s and 215 P 631s were built, including prototypes and export variants.

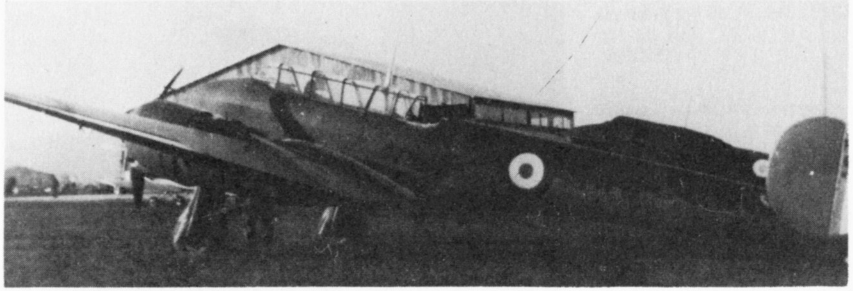
* * *

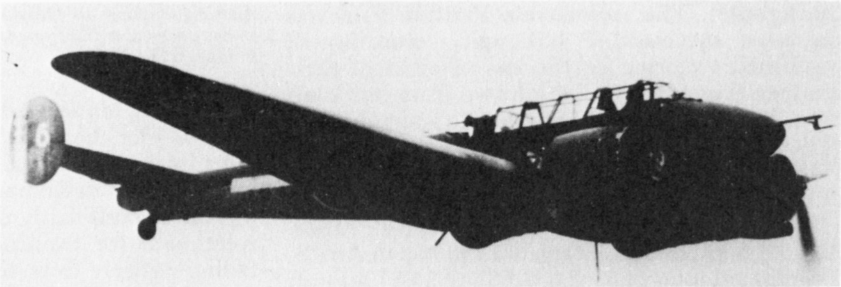
Despite the relatively rapid build-up of production of the P 630 and 631, deliveries were initially delayed by a shortage of aero-engines, propellers and cannons. The armament was originally planned as two forward-firing 20-mm HS 9 or HS 404 cannon and one flexible rearward-firing 7·5-mm MAC 1934 machine-gun, but the first P 630s had a forward-firing armament of four 7·5-mm guns and many P 631s had only one 20-mm cannon and one 7·5-mm machine-gun under the belly. Only 45 P 630s and 27 P 631s had been delivered by January 1, 1939, although it had been hoped that a combined total of 201 would have been delivered by this date. Sixty P 631s were subsequently taken on charge by the Air Force with provisional propellers and put into storage until the definitive assemblies became available.

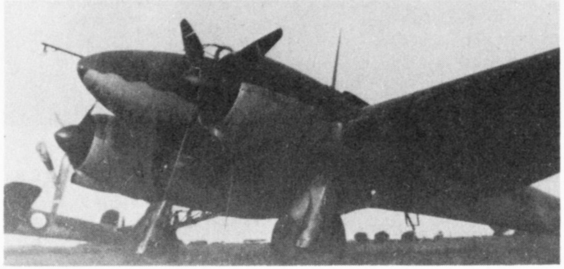
The first P 630s, issued to units in the Autumn of 1938, went to the Escadres de Chasse at Chartres (2nd and 6th), Dijon (3rd and 7th), Etampes (1st), and Rheims (4th and 5th) as fighter directors for the single-seat interceptor units. By the Spring of 1939, each of these Escadres had about six Potez fighters. Other units which received them were the Groupes de Chasse de Nuit (GCN) III/1 and II/4 who replaced their Mureaux 113s with P 630s; GC II/8, at Marignane, which specialised in naval co-operation, was equipped with 18 P 631s; and Groupe Aérien Mixte (GAM) 550, at Calvi, had a fighter flight of four P 631s. GCN III/1 and II/4 were respectively redesignated GCN I/13 and II/13 in May 1939 (their P 630s soon being replaced by P 631s) and, in August 1939, the Djibouti colonial squadron received a flight of four P 631s.

Production of the Potez two-motor fighters was complete when the war broke out and 85 P 630s and 206 P 631s were on Air Force charge. Sixty-five of the P 630s were with operational units, as were 117 of the P 631s. The P 630s were with: the 1st Escadre de Chasse (8 aircraft, bases already mentioned); the 2nd (12); 3rd (9); 4th (1); 5th (8); 6th (8); 7th (9); and Tunisia-based units (10). The breakdown for the P 631 was: GCN I/13 (at Etampes, 18 aircraft); GCN II/13 (Rheims, 21); 1st Escadre de Chasse (4); 2nd (7); 3rd (6); 4th (8); 5th (6); 6th (7); 7th (6); 8th (26, mostly with GC II/8); GAM 550 (at Ajaccio, 4); plus the Djibouti colonial squadron (4).

At the outbreak of war, the Potez aircraft of GC II/2 and two each from GC II/4, II/5, I/6, II/6 and II/7—totalling two P 630s and 10 P 631s—were used to form Escadrille de Guet (Warning Squadron) I/16 which was based at Clermont under the aegis of GC II/2. This unit was redesignated Escadrille de Chasse Multiplace de Jour (ECMJ) I/16 late in January 1940 and

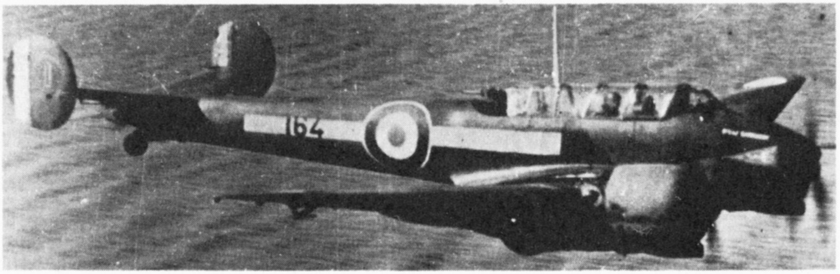






Left and above: *A number of P 631s were handed over to the Aéronavale in 1940, including No. 148 seen serving with Flottille F1C at Calais-Marck in May 1940* (Camouflage Air Club)

Above: *A P 631 of Escadrille de Chasse de Nuit I/13 seen in the Summer of 1940. Part of the white fuselage identification band can be seen aft of the wing, this marking being introduced on the P 631 in May 1940* (ECPA)



Right: *After the Armistice, it was not unusual for French aircraft to carry the names of men fallen in the fighting of May-June 1940. This P 631 of ECN 3/13, photographed in late-1940, commemorates Sgt-Chef Collinot* (Musée de l'Air)

severed its connection with GC II/2. A new night fighter unit, Escadrille de Chasse de Nuit (ECN) 2/562, was formed on October 12, 1939 with 12 P 631s and, on January 1, 1940, was redesignated ECN 5/13. On the same date, GCN I/13 and II/13 were broken up into independent Escadrilles as ECN 1/13, 2/13, 3/13 and 4/13.

The fighter direction duties of the Potez aircraft were ended in February 1940, those P 630s still in service being relegated to the dual-control training rôle while the P 631s were issued to the night fighter Escadrilles to increase their establishment from 12 to 18. The unsatisfactory forward-firing armament of the P 631s, often only one 20-mm cannon and one 7·5-mm machine-gun instead of two cannon, resulted in a February 1940 decision to refit them all progressively with a forward-firing armament of two 20-mm cannon under the belly and four 7·5-mm guns beneath the wings. Only two of the thus-modified aircraft were in service by May 10, although many more became available during the following weeks.

Concerned at its lack of modern fighters, the Aéronavale requested the supply of a number of Potez 631s, and the first batch of eight became available in mid-January 1940. They were issued to Escadrille AC1, based at Cherbourg, to replace its old Dewoitine D 376s, which had only been suitable for training. Then Escadrilles AC1 and AC2 were combined into the 1st Flottille de Chasse (F1C) on March 6, 1940 and during the next few weeks, GC II/8, then converting to the Bloch MB 152, turned over its P 631s to F1C.

One problem, which continually plagued the Potez 63 series aircraft, became evident during the "Phoney War", although nothing was done about it until the height of the Battle of France. This was the superficial resemblance of the Potez 63 to the Messerschmitt Bf 110, and this led to a number being attacked by "friendly" fighters and anti-aircraft guns. Finally, from May 24 onwards, distinctive markings were adopted for the P 631 comprising broad white bands along the fuselage sides on each side of the roundel which, in turn, was increased in size and encircled in white.

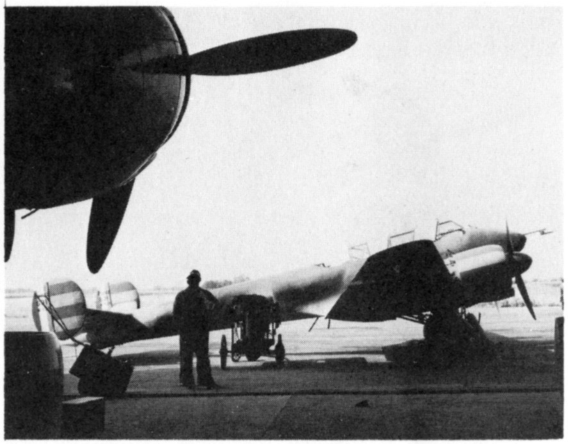
When the Germans invaded France and the Low Countries on May 10, 1940, the Potez 631 units were deployed as follows: Navy Flottille F1C (comprising Escadrilles AC1 and AC2) was at Calais-Marck; ECMJ I/16 was at Wez-Thisy as part of Groupement 23; ECN 1/13 at Le Plessis-Belleville; ECN 2/13 at Meaux-Esbly, ECN 3/13 at Melun-Villaroche, and ECN 4/13 at Betz-Bouillancy made up the Groupement de Chasse de Nuit for the night defence of the Paris area; and, ECN 5/13 was at Lyons-Bron for the night defence of the Lyons, Saint-Etienne and Le Creusot areas.

Generally, the performance of the P 631 as an interceptor during the fighting was poor and the night fighter units' effectiveness was considerably diminished by the lack of any reliable means of detecting night flying enemy aircraft. As a result, most of the Air Force P 631s were eventually put into use as ground-attack aircraft against the seemingly unstoppable German armies. They suffered heavily in this rôle at the hands of both German "flak" and Messerschmitt Bf 109 fighters. As June progressed and the German breakthrough on the Somme was exploited, the Potez units fell back and the Armistice found them in Southern France. But unlike many single-seat fighter units, they were not ordered to cross the Mediterranean to North Africa.

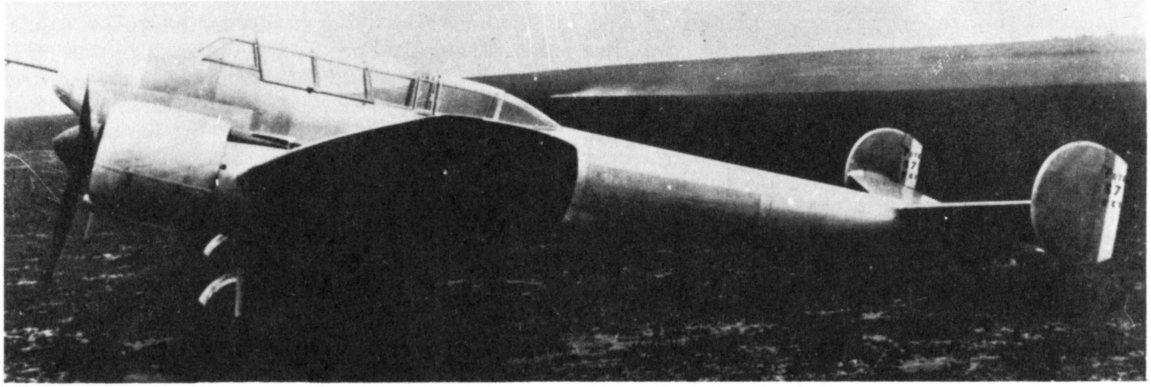
The six French Air Force units equipped with the P 631 scored 17 confirmed victories during the fighting. The Aéronavale Flottille F1C was the most successful P 631 unit, recording 12 confirmed victories for the loss of eight of their number. The unit was withdrawn from its Calais base shortly before the Armistice to re-equip with MB 151s and D 520s and saw no more action. When a count of the surviving aircraft was taken at the end of June 1940, there were 32 P 630s and 112 P 631s in the Free Zone of Southern France. A small number found their way to North Africa, a combined total of 53 P 630/631/633/637 aircraft being counted there.

Two units remained equipped with the P 631 in the Armistice Air Force: ECN 1/13 and 3/13 (the latter actually being the former 4/13 renumbered), both based at Nimes-Coubessac. ECN 3/13 was transferred to Gabes, in Tunisia, to re-inforce GC II/7, then equipped with D 520s, and was still there at the time of the Allied invasion of North Africa. Meanwhile, Potez numbers in the Armistice Air Force were dwindling: 22 P 630 trainers and 82 P 631s were listed in the strength returns on November 1, 1941, but by the following November 1, only six P 630s and 64 P 631s were recorded.

The P 631s of ECN 3/13 did not take part in the resistance to the Allied landings. However, they were in service briefly with the Allies in November 1942 for the defence of Gabes against German air attack, but were withdrawn at the end of that month. The Germans seized some P 631s among the 134 Potez aircraft in Southern France when the Free Zone was occupied, but it seems that they were more interested in their Gnôme-Rhône engines—for the Henschel Hs 129, for example—than in the airframes, although a small quantity was delivered to Romania.



After refurbishing at Méaulte in 1942, this P 631 carries the production number 528—presumably off a P 63.11, since the last P 631 was No. 207 (ECPA)



The Potez 670 was developed to meet a 1936 fighter specification. After modification to take Hispano-Suiza 14 Ab12/13 radials in 1939, it was known as the P 671, the P 671-01 being shown here (ECPA)

The aircraft with the Allies in North Africa were used for training for a while but, before fading entirely from the scene, the P 631 was to have one last, brief operational fling. Groupe de Reconnaissance (GR) III/33, part of the Forces Aériennes de l'Atlantique (which in turn was an arm of the Forces Françaises de l'Intérieur), operated a few P 631s for reconnaissance alongside its 20 Fieseler Fi 156 Storch high-wing monoplanes and other assorted aircraft. Some of these P 631s survived the war and were used for a period as trainers at the Centre d'Essais en Vol, Brétigny-sur-Orge.

* * *

Reference has been made, in the context of Plan V, to the 1936 Specification for a two-motor fighter and it is worthy of mention at this point, although its history is not known with certainty. The Specification, known as STAé A22, was for a three-seat aircraft and the competitors included: Caudron C 810, Dewoitine D 600, Hanriot H 270, Lioré-et-Olivier LeO 50, a Loire-Nieuport design, and the Potez P 670.

The P 670 bore a family resemblance to the P 63 series and was to be powered by two 840 hp Hispano-Suiza 14 CA radials. The SNCAN received an order for two prototypes, Contract 1170/7, and the first prototype started flight trials in March 1939 as the Potez 671-01, this designation being given because Gnôme-Rhône 14Ms were installed pending availability of the Hispano-Suiza 14 CA.

The further career of P 671 is uncertain, although the Air Staff was aware that the design was underpowered. An order for 210 P 671s (Contract 1762/9) was placed in 1939, but later cancelled. It seems that the 1936 Specification was abandoned in favour of the much more promising two-motor SNCASE SE 100, for which mass-production plans were in hand at the time of the Armistice.

Potez P 630-631 Specification

Type: Two/three-seat long-range and night fighter; low-wing, all-metal monoplane with retractable main undercarriage.
Powerplant[(P 630 Nos. 1-49) Two Hispano-Suiza 14 AB 02/03 14-cylinder air-cooled radials rated at 650 hp for take-off and 670 hp at 13,120 ft. (P 630 No. 49 onwards) Two Hispano-Suiza 14 AB 10/11 radials rated at 700 hp for take-off and 720 hp at altitude. (P 631) Two Gnôme-Rhône 14 M4/M5 or M6/M7 rated at 700 hp for take-off and 660 hp at 16,400 ft.
Armament: (P 630) Although two 20-mm cannon were meant to be installed under the belly, many P 630s carried a forward-firing armament of four 7.5-mm MAC 1934 machine-guns with 300 rounds per gun or one cannon and one machine-gun. A 7.5-mm flexible MAC 1934 machine-gun with 1,000 rounds was carried for rear defence. (P 631) Two 20-mm Hispano-Suiza HS 9 or HS 404 cannon with up to 90 rpg under the belly firing forwards plus a 7.5-mm MAC 1934 machine-gun, with 1.000 rounds, mounted flexibly in the rear cockpit for rear defence. Some P 631s carried one cannon and one machine -gun under the belly, and in 1940 some carried four supplementary forward-firing 7.5-mm machine guns in underwing fairings.
Dimensions: (Both versions) Span, 52.49 ft; length, 36.31 ft; height, 11.87 ft; wing area, 352 sq ft.
Weights: (P 630) Normal loaded, 8,488 lb. (P 631) Empty, 6,526 lb; normal loaded, 8,289 lb; maximum loaded, 9,921 lb.
Performance: (P 631 only) Maximum speed, 224 mph at sea-level and 275 mph at 14,764 ft; climb to 13,123 ft, 5 min 56 sec; service ceiling, 29,530 ft; range, 472 ml at 267 mph at 19,357 ft and 758 ml at 149 mph at 6,234 ft.

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